

HP ProLiant DL380 Generation 4 Server Maintenance and Service Guide



August 2004 (Second Edition)
Part Number 359226-002

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Audience Assumptions

This guide is for an experienced service technician. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels and are familiar with weight and stability precautions for rack installations.

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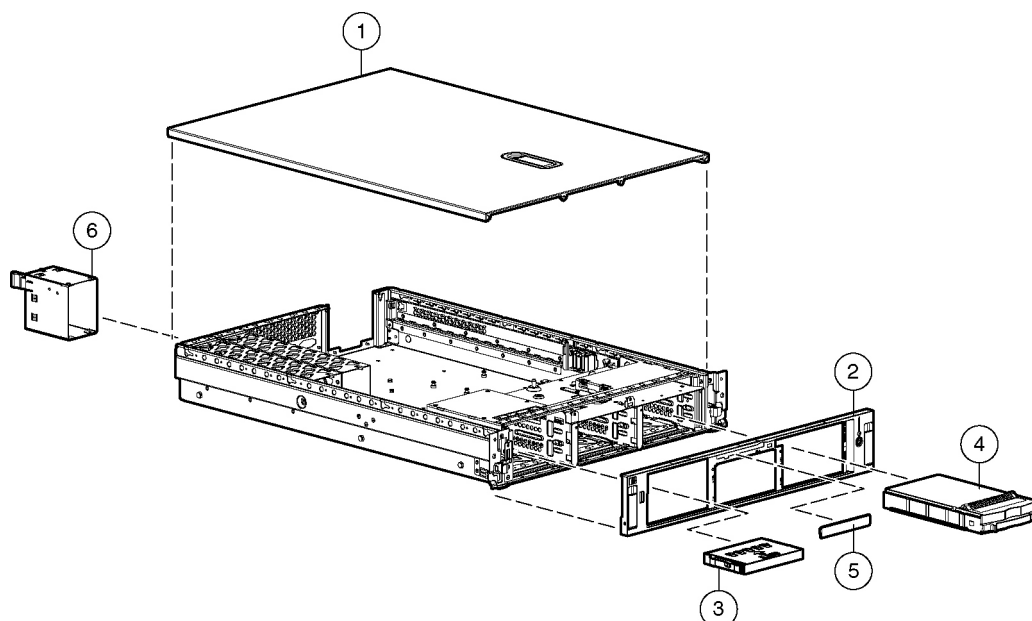
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Illustrated Parts Catalog

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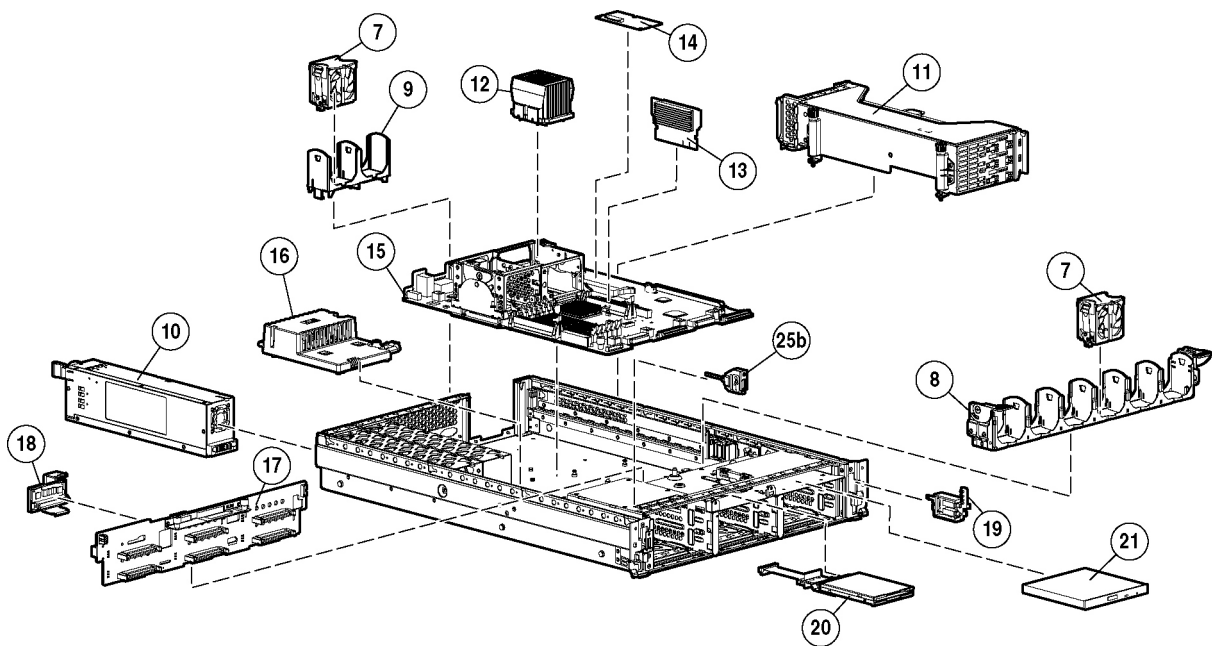
Mechanical Components



Item	Description	Assembly Part Number	Spare Part Number
1	Access panel	344465-001	359244-001
2	Front bezel	344433-001	359245-001
3	Tape drive blank	218512-002	367666-001
4	Hard drive blank	302531-002	122759-001

Item	Description	Assembly Part Number	Spare Part Number
5	Diskette drive slot cover (see "Plastics Kit," Item 28k)	—	—
6	Power supply blank	344436-001	359246-001

System Components



Item	Description	Assembly Part Number	Spare Part Number
	System Components		
7	Hot-plug fan, 60 mm	279036-001	289544-001
8	Front fan bracket, 6 bay	279037-002	371148-001
9	Rear fan bracket, 2 bay	279060-001	289558-001
10	Hot-plug power supply, 575 W	321632-001	338022-001
11	PCI riser cages		

Item	Description	Assembly Part Number	Spare Part Number
	a) PCI riser cage, with non-hot-plug PCI-X (standard)	344437-001	359248-001
	b) PCI riser cage, with non-hot-plug PCI Express (optional) *	344437-003	359259-001
	c) PCI riser cage, with Hot Plug PCI-X (optional) *	344437-002	359260-001
12	Processor assemblies		
	a) Intel® 3.2-GHz Xeon™ 1-MB L2 cache	349931-003	374233-001
	b) Intel® 3.4-GHz Xeon™ 1-MB L2 cache	349931-002	364757-001
	c) Intel® 3.6-GHz Xeon™ 1-MB L2 cache	349931-001	364758-001
	Boards		
13	Processor Power Module, 12 V, 105 A	326294-001	347884-001
14	Smart Array 6i cache module	012304-001	351518-001
15	System board, with processor cages and system battery	012317-001	359251-001
16	Power converter module	321633-001	361667-001
17	SCSI backplane, 6 bay	012055-001	359253-001
18	SCSI terminator	011730-001	289563-001
19	Power button/LED board	010963-002	366300-001
	Media Devices		
20	Diskette drive, slimline, 1.44 MB (optional)	279983-001	289550-001
21	CD-ROM drive, removable slimline, IDE, 24X	222837-001	228508-001
22	DVD-ROM drive, removable slimline, 8X *	264007-B21	268795-001
	Cables		
23	SCSI cable kit *		289567-001
	a) SCSI cable, short, 68 pin	199606-019	—
	b) SCSI cable, long, 68 pin	166298-038	—
	c) System cable, SCSI, 50 pin	279161-001	—
24	Signal cable kit *	—	366063-001
	a) Power button/LED board cable, 14 pin	219048-001	—

Item	Description	Assembly Part Number	Spare Part Number
	b) PCI Hot Plug LED board cable	219049-002	—
	c) Universal Media Bay cable, 50 pin	356452-001	—
25	Miscellaneous cable kit	—	289569-001
	a) Diskette drive cable *	235183-001	—
	b) USB cable and connector	346187-001	—
	Rack Mounting Hardware		
26	2U Quick Deploy Rail System *	—	359254-001
	Miscellaneous		
27	Hardware kit *	—	228527-001
	a) Screws, T-15, flat-head	228213-001	—
	b) Expansion slot cover	228072-001	—
	c) Screws, 6-32	192308-009	—
28	Plastics kit *	—	359720-001
	a) PCI slot release lever	228194-002	—
	b) PCI lightpipe, rear	279061-001	—
	c) PCI lightpipe, cover	218518-001	—
	d) PCI riser cage door latch	279062-001	—
	e) Thumbscrew with molded cap, PCI slot 1	179333-003	—
	f) Standoff	225249-002	—
	g) Plastic standoff 0.134	225250-007	—
	h) Battery clip	280247-002	—
	i) PCI card guide retainer	233614-004	—
	j) Thumbscrew knob	249083-001	—
	k) Diskette drive slot cover	352834-001	—
29	AC power cord *	163719-002	187335-001
30	DVD/CD-ROM drive ejector assembly *	356443-001	371114-001

Item	Description	Assembly Part Number	Spare Part Number
31	PCI expansion board ejector *	279035-002	359261-001
32	Battery, 3.3 V, lithium *	334149-001	179322-001
33	Country kit *		359722-001
34	Return kit, pack box, and cushions *	—	289545-001
35	Torx tool *	120473-001	199630-001
	Memory		
36	DIMM, 512 MB, registered DDR2 SDRAM *	343055-B21	359241-001
37	DIMM, 1 GB, registered DDR2 SDRAM *	343056-B21	359242-001
38	DIMM, 2 GB, registered DDR2 SDRAM *	343057-B21	359243-001
	Options		
39	Battery-Backed Write Cache battery pack *	274779-001	307132-001
40	Battery-Backed Write Cache battery bracket *	335771-001	349989-001
41	SCSI Ultra320 universal hot-plug hard drive *		
	a) 36.4-GB 10K rpm	286713-B22	289041-001
	b) 72.8-GB 10K rpm	268714-B22	289042-001
	c) 146.8-GB 10K rpm	286716-B22	289044-001
	d) 18.2-GB 15K rpm	286775-B22	289240-001
	e) 36.4-GB 15K rpm	286776-B22	289241-001
	f) 72.8-GB 15K rpm	289788-B22	289243-001

*Not shown

Removal and Replacement Procedures

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Required Tools

You need the following items for some procedures:

- Torx T-15 tool (provided inside the server)
- HP Insight Diagnostics software ("HP Insight Diagnostics" on page [88](#))

Safety Considerations

Before performing service procedures, review all the safety information.

Preventing Electrostatic Discharge

To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.

- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

Server Warnings and Cautions

Before installing a server, be sure that you understand the following warnings and cautions.



WARNING: To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- Unplug the power cord from the power supply to disconnect power to the equipment.
- Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the server.



WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.



CAUTION: Do not operate the server for long periods without the access panel. Operating the server without the access panel results in improper airflow and improper cooling that can lead to thermal damage.

Preparation Procedures

To access some components and perform certain service procedures, you must perform one or more of the following procedures:

- Extend the server from the rack ("Extending the Server from the Rack" on page [16](#)).

If you are performing service procedures in an HP, Compaq branded, telco, or third-party rack cabinet, you can use the locking feature of the rack rails to support the server and gain access to internal components.

For more information about telco rack solutions, refer to the RackSolutions.com website (<http://www.racksolutions.com/hp>).

- Power down the server ("Powering Down the Server" on page [17](#)).

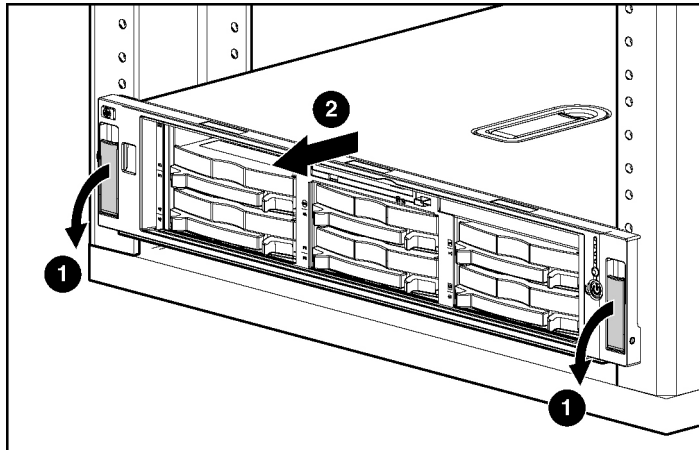
If you must remove a server from a rack or a non-hot-plug component from a server, power down the server.

- Remove the server from the rack ("Removing the Server from the Rack" on page [18](#)).

If the rack environment, cabling configuration, or the server location in the rack creates awkward conditions, remove the server from the rack.

Extending the Server from the Rack

1. Pull down the quick release levers on each side of the server to release the server from the rack.



2. Extend the server on the rack rails until the server rail-release latches engage.



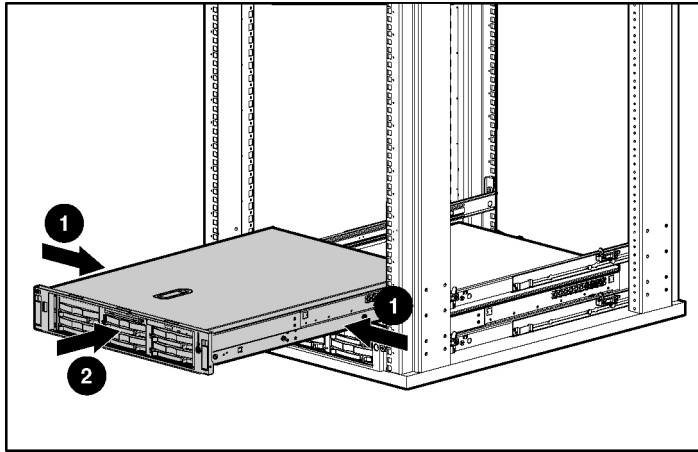
WARNING: To reduce the risk of personal injury or equipment damage, be sure that the rack is adequately stabilized before extending a component from the rack.



WARNING: To reduce the risk of personal injury, be careful when pressing the server rail-release latches and sliding the server into the rack. The sliding rails could pinch your fingers.

3. After performing the installation or maintenance procedure, slide the server back into the rack:

- a. Press the server rail-release latches and slide the server fully into rack.



- b. Press the server firmly into the rack to secure it in place.

Powering Down the Server

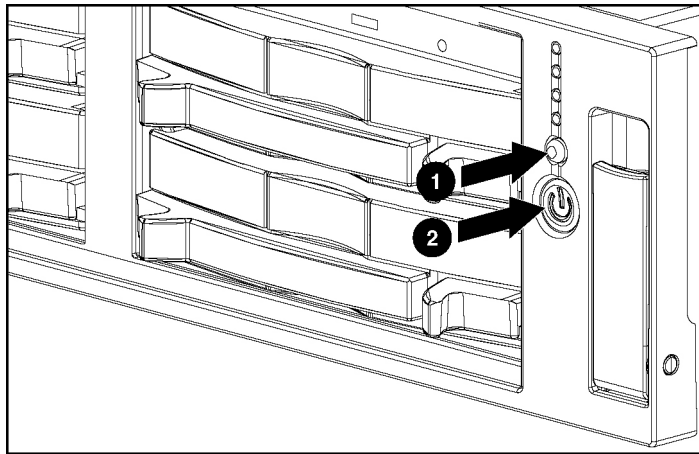


WARNING: To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.

IMPORTANT: If installing a hot-plug device, it is not necessary to power down the server.

1. Back up the server data.
2. Shut down the operating system as directed by the operating system documentation.
3. If the server is installed in a rack, press the UID LED button on the front panel (1). Blue LEDs illuminate on the front and rear panels of the server.

4. Press the Power On/Standby button to place the server in standby mode (2). When the server activates standby power mode, the system power LED changes to amber.



5. If the server is installed in a rack, locate the server by identifying the illuminated rear UID LED button.
 6. Disconnect the power cords.
- The system is now without power.

Removing the Server from the Rack

To remove the server from an HP, Compaq branded, telco, or third-party rack:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend the server from the rack ("Extending the Server from the Rack" on page [16](#)).
3. Disconnect the cabling and remove the server from the rack. For more information, refer to the documentation that ships with the rack mounting option.
4. Place the server on a sturdy, level surface.

Removing the Access Panel



WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

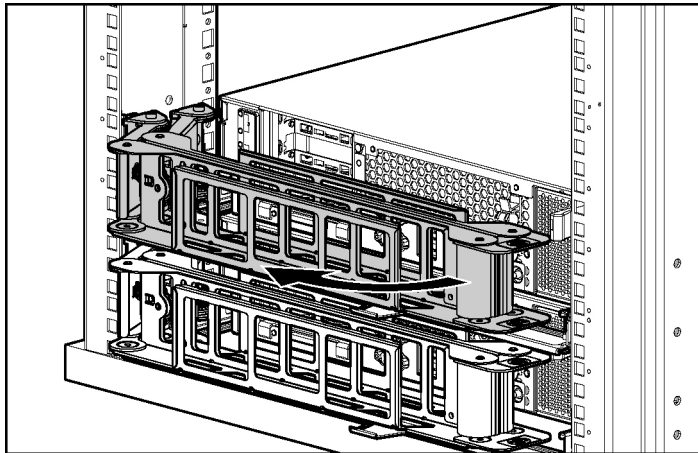


CAUTION: Do not operate the server for long periods without the access panel. Operating the server without the access panel results in improper airflow and improper cooling that can lead to thermal damage.

1. Power down the server if performing a non-hot-plug installation or maintenance procedure ("Powering Down the Server" on page [17](#)).
2. Extend the server from the rack, if applicable ("Extending the Server from the Rack" on page [16](#)).
3. Lift up on the hood latch handle and remove the access panel.

Opening the Cable Management Arm

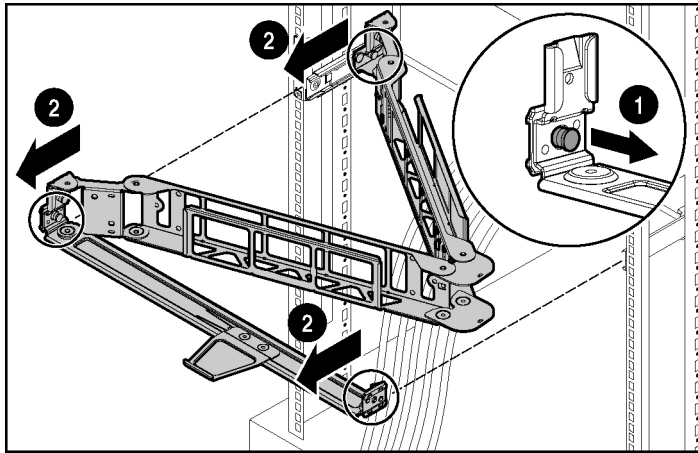
To access the server rear panel, open the cable management arm:



Removing the Cable Management Arm

To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Open the cable management arm ("Opening the Cable Management Arm" on page [19](#)).
3. Remove the cables from the cable trough.
4. Remove the cable management arm.



To replace the component, reverse the removal procedure.

Non-Hot-Plug Procedures

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DVD/CD-ROM Drive

To remove the component:

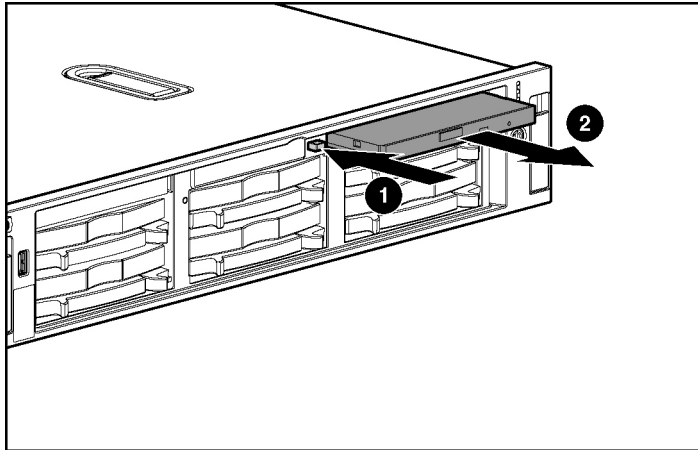


CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

1. Power down the server ("Powering Down the Server" on page [17](#)).

IMPORTANT: The ejector button is recessed to prevent accidental ejection; it may be helpful to use a pen or similar shaped object to access the button.

2. Remove the drive.



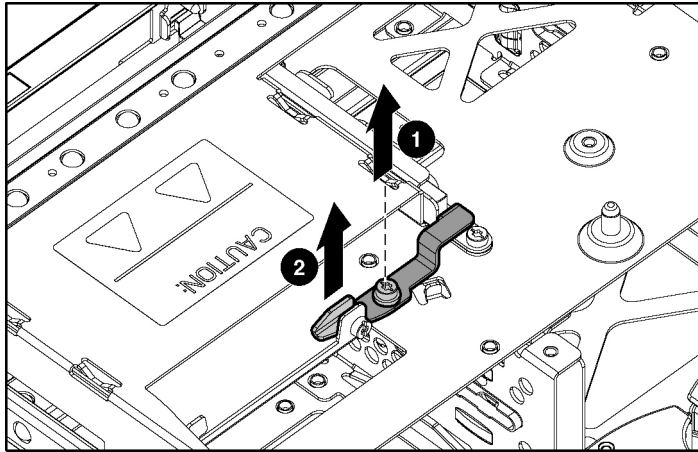
To replace the drive, slide the drive into the bay until the drive is fully seated.

DVD/CD-ROM Drive Ejector Assembly

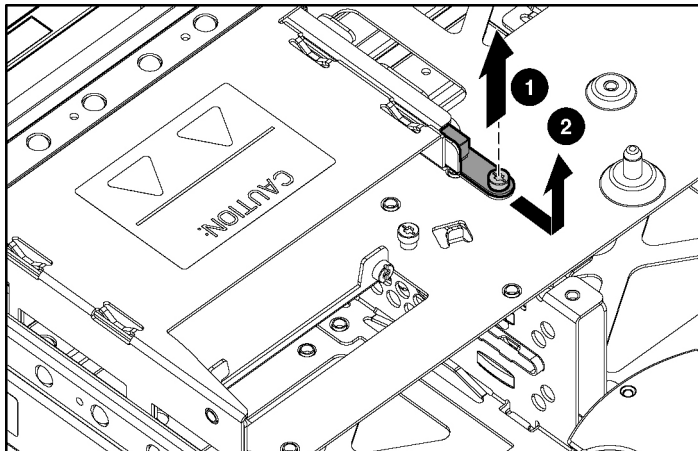
To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).
4. Remove the DVD/CD-ROM drive, if installed ("DVD/CD-ROM Drive" on page [21](#)).
5. Remove the diskette drive ("Diskette Drive Option" on page [24](#)).

6. Remove the ejector lever.



7. Press and hold the ejector button.
8. Remove the ejector assembly.



To replace the component, reverse the removal procedure.

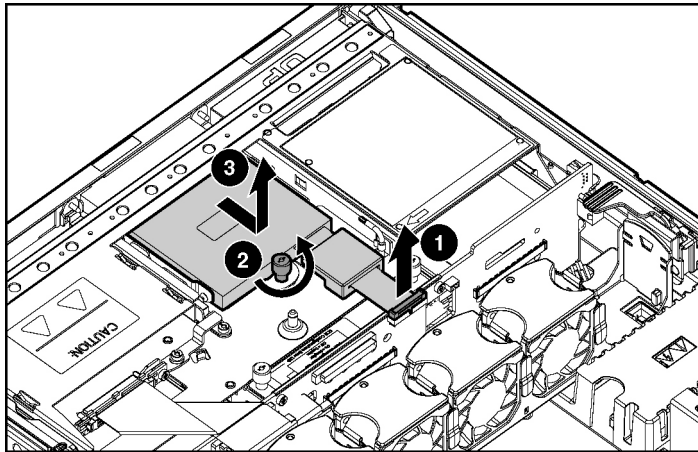
Diskette Drive Option

To remove the component:



CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).
4. Remove the diskette drive.



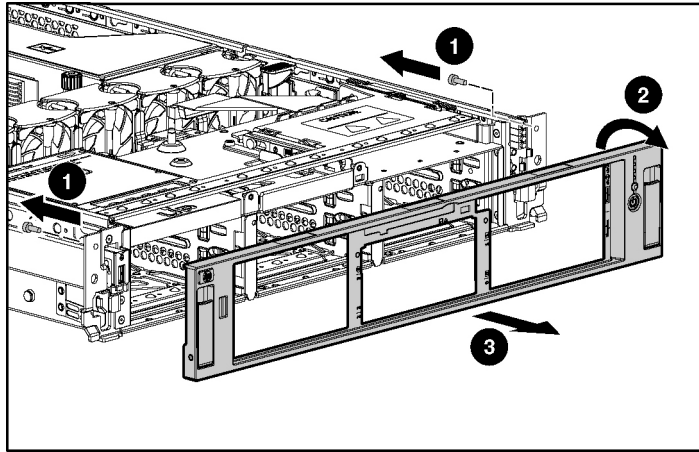
To replace the component, reverse the removal procedure.

Front Bezel

To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).

3. Remove the two screws and detach the front bezel.



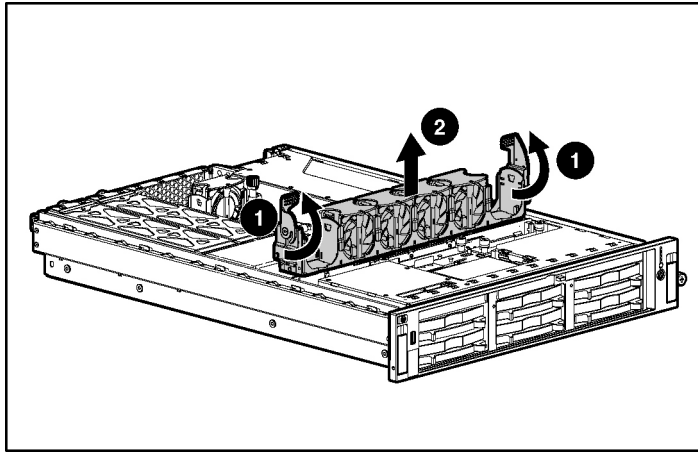
To replace the component, reverse the removal procedure.

Front Fan Bracket

To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).

4. Remove the front fan bracket.



5. Remove all hot-plug fans from the front fan bracket ("Hot-Plug Fan" on page [60](#)).

To replace the front fan bracket, reverse the removal steps and press down on the top of each fan to be sure it is seated properly.

Rear Fan Bracket

To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).



CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

4. Remove the PCI riser cage ("PCI Riser Cage" on page [33](#)).
5. Remove the front fan bracket ("Front Fan Bracket" on page [25](#)).

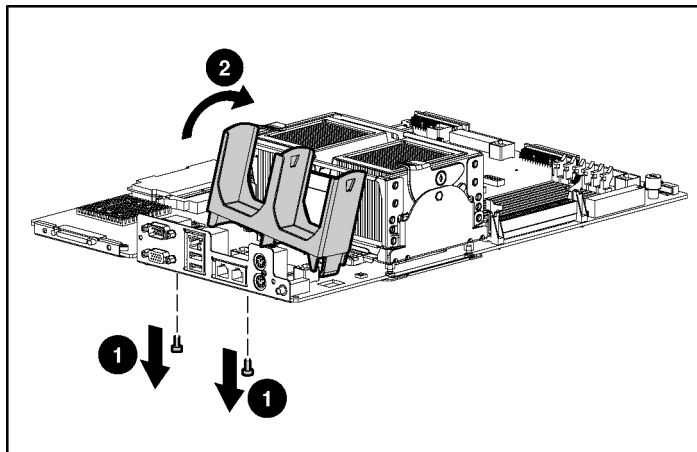
IMPORTANT: For this procedure, you do not need to remove the hot-plug fans from the front fan bracket. When reinstalling the front fan bracket, press the top of each fan to be sure it seats securely.

6. Remove the hot-plug fans from the rear fan bracket ("Hot-Plug Fan" on page [60](#)).

7. Remove the system board.

NOTE: When removing the system board, you may leave the DIMMs, the processors, the PPMs, the Smart Array 6i memory module, and the system battery on the system board, unless you are replacing them as failed items.

8. Remove the rear fan bracket.



To replace the component, reverse the removal procedure.

Battery-Backed Write Cache Procedures

Two types of procedures are provided for the BBWC option.

1. Removal and replacement of failed components:
 - Removing the Smart Array 6i Cache Module ("Smart Array 6i Cache Module" on page [28](#))
 - Removing the BBWC Battery Pack ("Battery-Backed Write Cache Battery Pack" on page [30](#))

2. Recovery of cached data from a failed server ("Recovering Data from the Battery-Backed Write Cache" on page [31](#))



CAUTION: Do not detach the cable that connects the battery pack to the cache module. Detaching the cable causes any unsaved data in the cache module to be lost.

Smart Array 6i Cache Module

To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).



CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

4. Remove the PCI riser cage ("PCI Riser Cage" on page [33](#)).

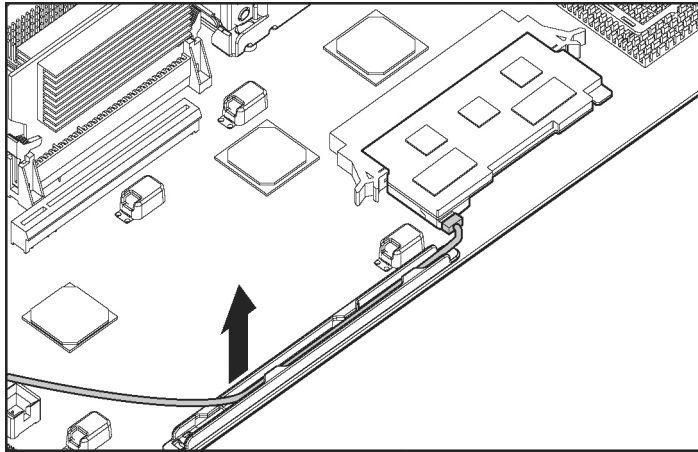


CAUTION: To prevent a server malfunction or damage to the equipment, do not add or remove the battery pack while an array capacity expansion, RAID level migration, or stripe size migration is in progress.

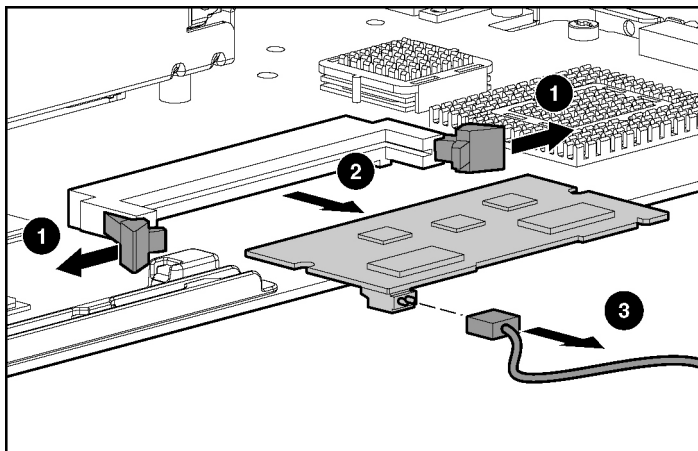


CAUTION: After the server is powered down, wait 15 seconds and then check the amber LED before unplugging the cable from the cache module. If the amber LED blinks after 15 seconds, do not remove the cable from the cache module. The cache module is backing up data, and data will be lost if the cable is detached.

5. Remove the cable from the plastic retainer.



6. Remove the Smart Array 6i cache module.
7. Disconnect the cable.



To replace the component, reverse the removal procedure.



CAUTION: To prevent damage to the cache module during installation, be sure the cache module is fully inserted before pressing down.

Battery-Backed Write Cache Battery Pack

To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).

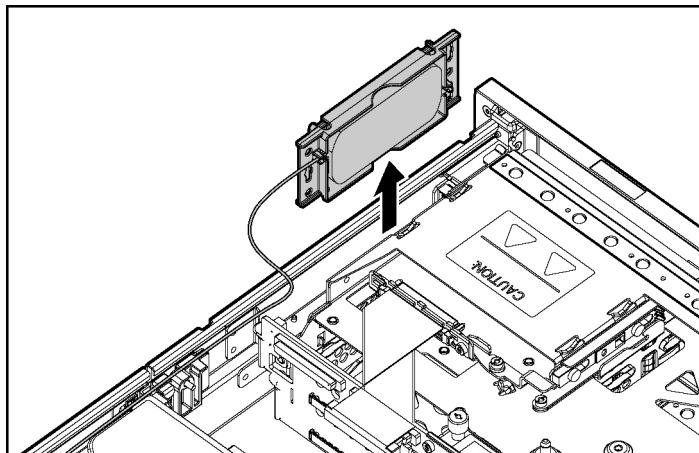


CAUTION: To prevent a server malfunction or damage to the equipment, do not add or remove the battery pack while an array capacity expansion, RAID level migration, or stripe size migration is in progress.



CAUTION: After the server is powered down, wait 15 seconds and then check the amber LED before unplugging the cable from the cache module. If the amber LED blinks after 15 seconds, do not remove the cable from the cache module. The cache module is backing up data, and data will be lost if the cable is detached.

4. Remove the front fan bracket ("Front Fan Bracket" on page [25](#)).
5. Remove the Smart Array 6i cache module ("Smart Array 6i Cache Module" on page [28](#)).
6. Remove the BBWC Enabler, also known as the battery pack.



To replace the component, reverse the removal procedure.

IMPORTANT: The battery pack may have a low charge when installed. In this case, a POST error message is displayed when the server is powered up, indicating that the battery pack is temporarily disabled. No action is necessary on your part. The internal circuitry automatically recharges the batteries and enables the battery pack. This process may take up to 4 hours. During this time, the cache module will function properly, but without the performance advantage of the battery pack.

NOTE: The data protection and the time limit also apply if a power outage occurs. When power is restored to the system, an initialization process writes the preserved data to the hard drives.

Recovering Data from the Battery-Backed Write Cache

If the server fails, you can recover any data temporarily trapped in the BBWC by using the following procedure.



CAUTION: Before starting this procedure, read the information about protecting against electrostatic discharge ("Preventing Electrostatic Discharge" on page [13](#)).

1. Perform one of the following:
 - Set up a recovery server station using an identical server model. Do not install any internal drives or BBWC in this server. (This is the preferred option.)
 - Find a server that has enough empty drive bays to accommodate all the drives from the failed server and that meets all the other requirements for drive and array migration.
2. Power down the failed server ("Powering Down the Server" on page [17](#)). If any data is trapped in the cache module, an amber LED on the module blinks every 15 seconds.



CAUTION: Do not detach the cable that connects the battery pack to the cache module. Detaching the cable causes any unsaved data in the cache module to be lost.

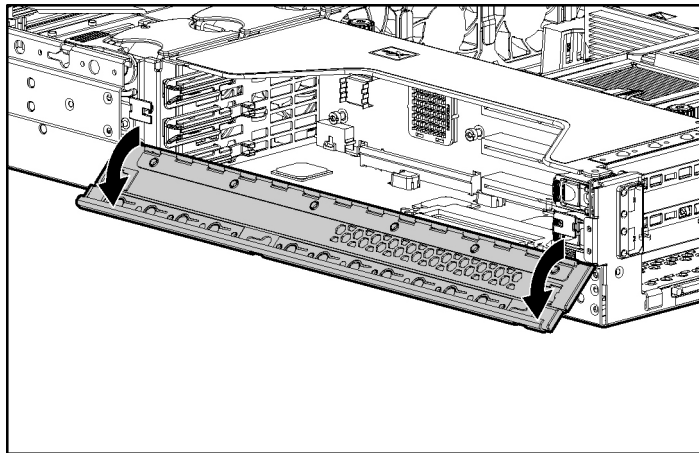
3. Transfer the hard drives from the failed server to the recovery server station.

4. Remove the BBWC [cache module ("Smart Array 6i Cache Module" on page [28](#)) and battery pack ("Battery-Backed Write Cache Battery Pack" on page [30](#))] from the failed server.
5. Perform one of the following:
 - Install the BBWC into an empty BBWC DIMM socket on the system board of the recovery server.
 - Install the BBWC into an empty BBWC DIMM socket on any Smart Array 641 or 642 controller in the recovery server.
6. Power up the recovery server. A 1759 POST message is displayed, stating that valid data was flushed from the cache. This data is now stored on the drives in the recovery server. You can now transfer the drives (and controller, if one was used) to another server.

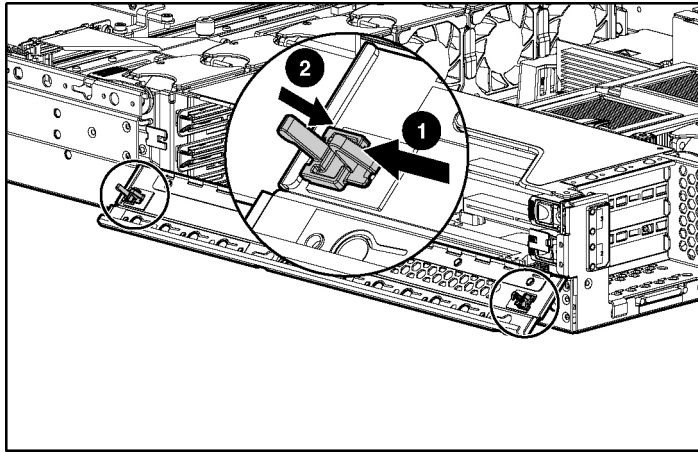
PCI Riser Cage Door Latch

To remove the component:

1. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
2. Remove the access panel ("Removing the Access Panel" on page [19](#)).
3. Open the PCI riser cage door.



4. Remove the PCI riser cage door latch.



PCI Riser Cage

To remove the component:

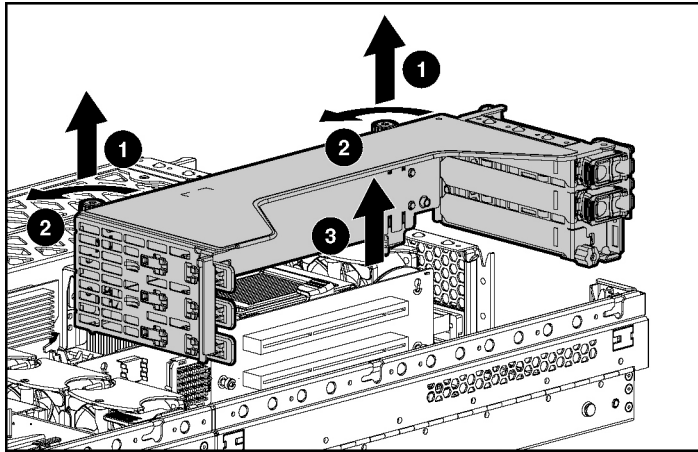
1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend the server from the rack, if applicable ("Extending the Server from the Rack" on page [16](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).



CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

4. Disconnect any internal or external cables connected to any existing expansion boards.
5. Lift the PCI riser cage thumbscrews and turn them counter-clockwise.

6. Remove the PCI riser cage.



To replace the component, reverse the removal procedure.

Expansion Board

To remove the component:

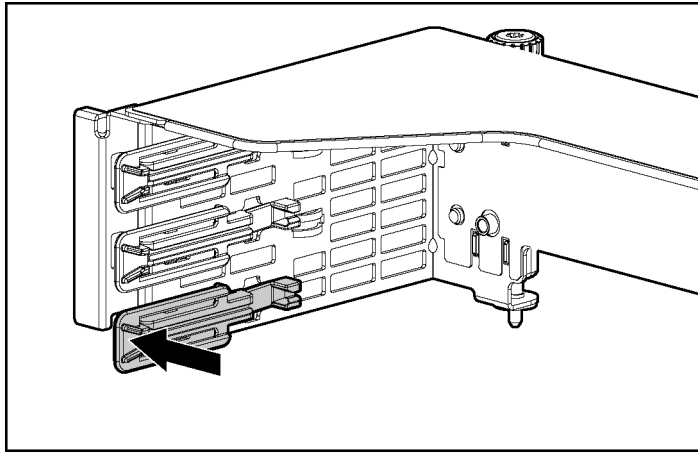
1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).



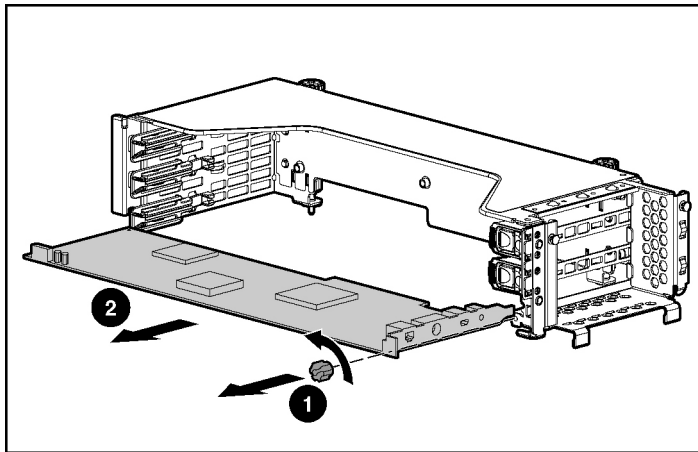
CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

4. Disconnect any cables connecting the expansion board to the PCI riser cage.
5. Remove the PCI riser cage ("PCI Riser Cage" on page [33](#)).

6. Unlock the PCI retaining clip.



7. Remove the expansion board.



CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all PCI slots have either an expansion slot cover or an expansion board installed.

To replace the component, reverse the removal procedure.

Expansion Slot Cover

To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).



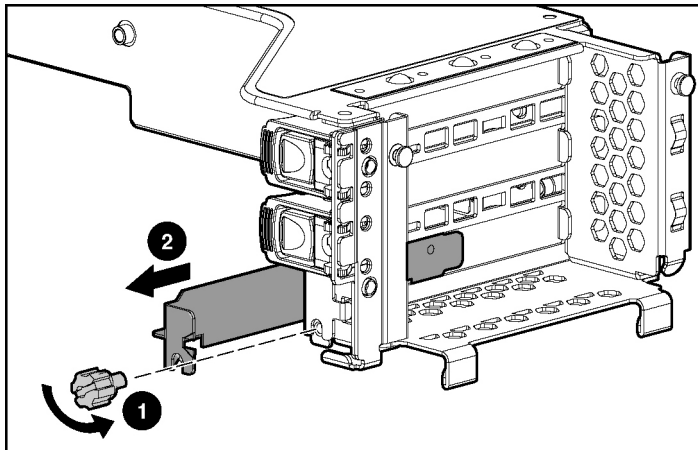
CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

4. Remove the PCI riser cage ("PCI Riser Cage" on page [33](#)).



CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all PCI slots have either an expansion slot cover or an expansion board installed.

5. Remove the expansion slot cover.



To replace the component, reverse the removal procedure.

Expansion Board Ejector/Divider

NOTE: This component is available only with the optional, hot-plug PCI riser cage.

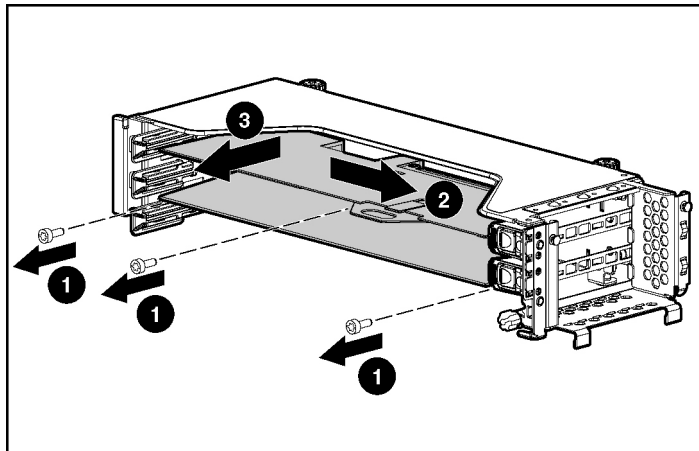
To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).
4. Remove the PCI riser cage ("PCI Riser Cage" on page [33](#)).



CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

5. Remove the expansion board ejector/divider.



CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all PCI slots have either an expansion slot cover or an expansion board installed.

To replace the component, reverse the removal procedure.

PCI Slot Release Lever

To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).



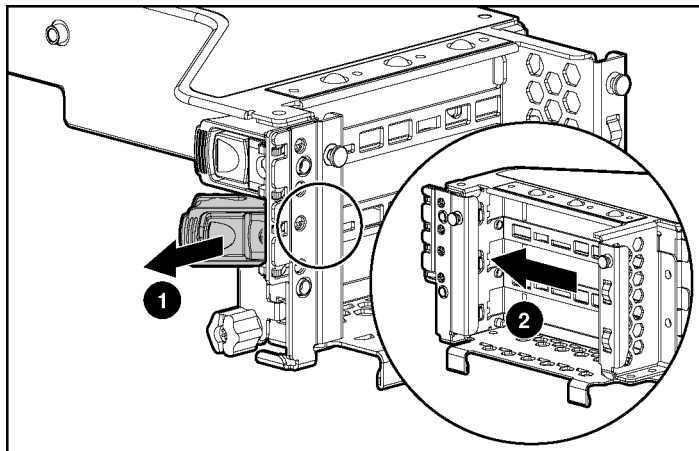
CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

4. Remove the PCI riser cage ("PCI Riser Cage" on page [33](#)).



CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

5. Remove the expansion board from the slot, if installed.
6. Remove the expansion slot cover from the slot, if installed.
7. Remove the PCI slot release lever.



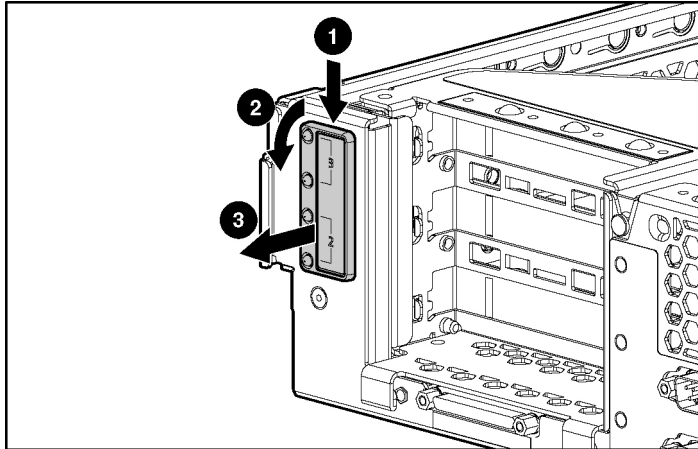
To replace the component, reverse the removal procedure.

PCI Lightpipe and Cover

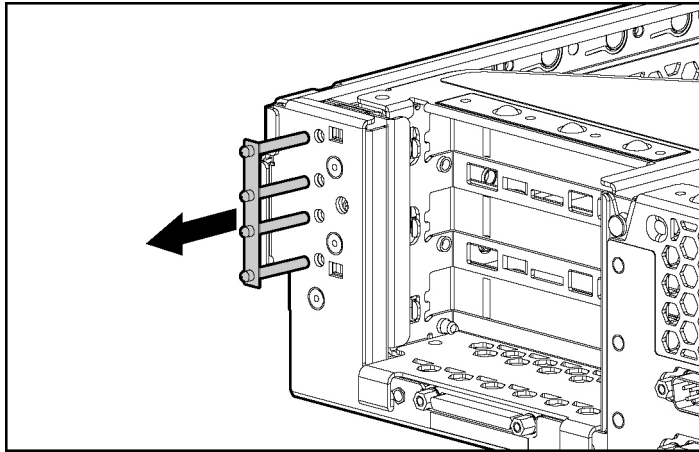
NOTE: This component is available only with the optional, hot-plug PCI riser cage.

To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).
4. Remove the PCI lightpipe cover.



5. Slide the lightpipe out of the chassis.



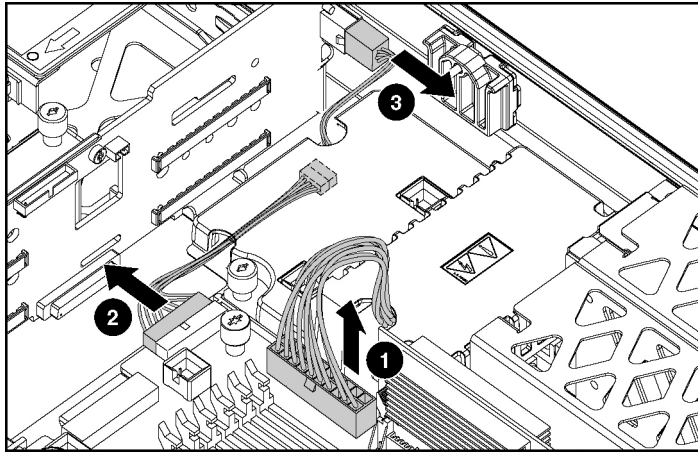
To replace the component, reverse the removal procedure.

Power Converter Module

To remove the component:

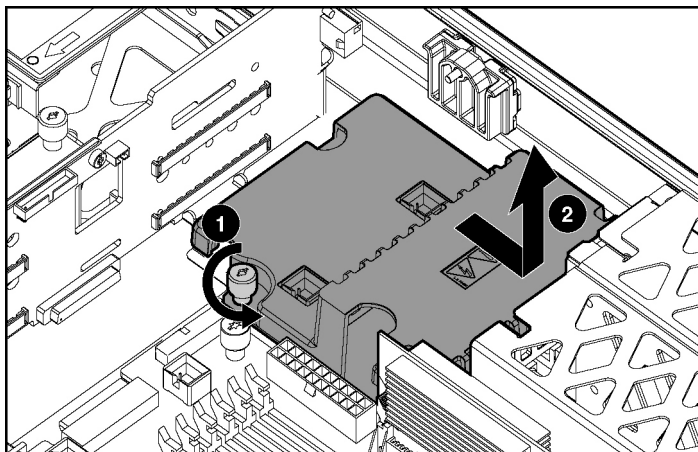
1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).
4. Remove the front fan bracket ("Front Fan Bracket" on page [25](#)).
IMPORTANT: For this procedure, you do not need to remove the hot-plug fans from the front fan bracket. When reinstalling the front fan bracket, press the top of each fan to be sure it seats securely.
5. Remove all hot-plug power supplies ("Hot-Plug Power Supply" on page [57](#)).

6. Disconnect all power cables.



7. Remove the power converter module.

NOTE: Cables are removed for clarity.

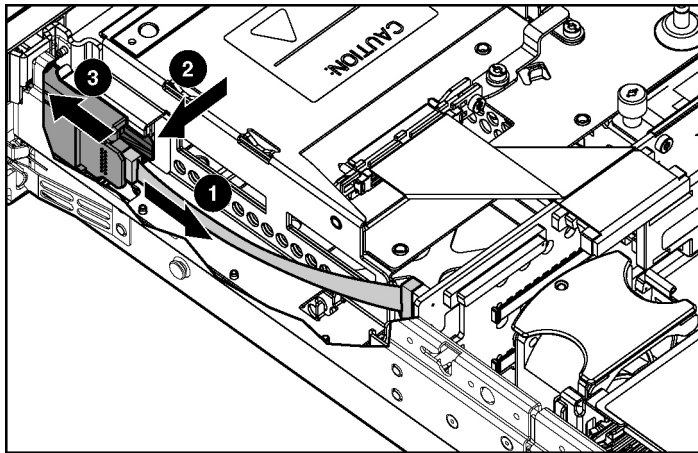


To replace the component, reverse the removal procedure.

Power Button/LED Board

To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the front bezel ("Front Bezel" on page [24](#)).
4. Remove the access panel ("Removing the Access Panel" on page [19](#)).
5. Remove the BBWC battery pack. ("Battery-Backed Write Cache Battery Pack" on page [30](#))
6. Remove the power button/LED board.



To replace the component, reverse the removal procedure.

DIMMs

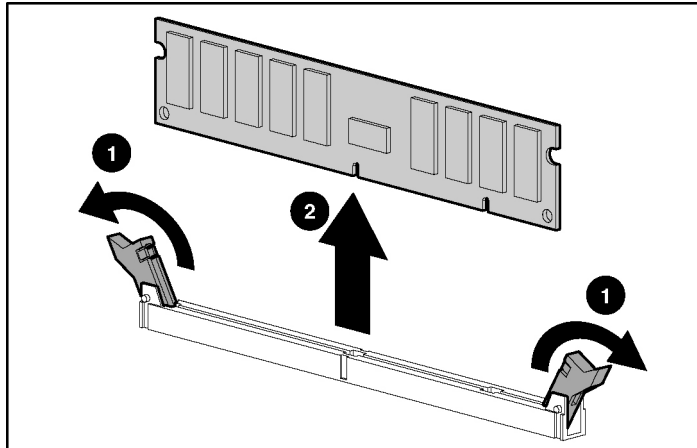
To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).

3. Remove the access panel ("Removing the Access Panel" on page [19](#)).

NOTE: The server ships with at least two DIMMs installed in DIMM slots 1A and 2A.

4. Remove the DIMM.



CAUTION: Be sure to install DIMMs in the proper configuration. Refer to the Documentation CD.



CAUTION: Use only Compaq branded or HP DIMMs. DIMMs from other sources may adversely affect data integrity.

IMPORTANT: DIMMs do not seat fully if turned the wrong way.

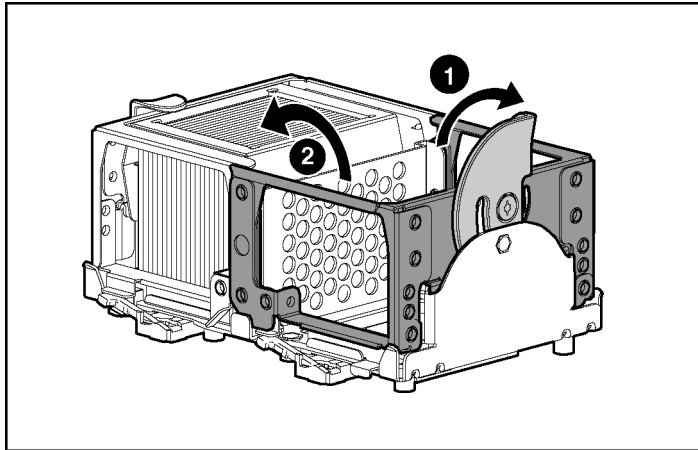
To replace a DIMM, align the DIMM with the slot and insert the DIMM firmly. When fully seated, the DIMM slot latches lock into place.

Processor

To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).

3. Remove the access panel ("Removing the Access Panel" on page [19](#)).
4. If an optional redundant fan is located next to the processor, remove the fan ("Hot-Plug Fan" on page [60](#)).
5. Open the processor retaining bracket.

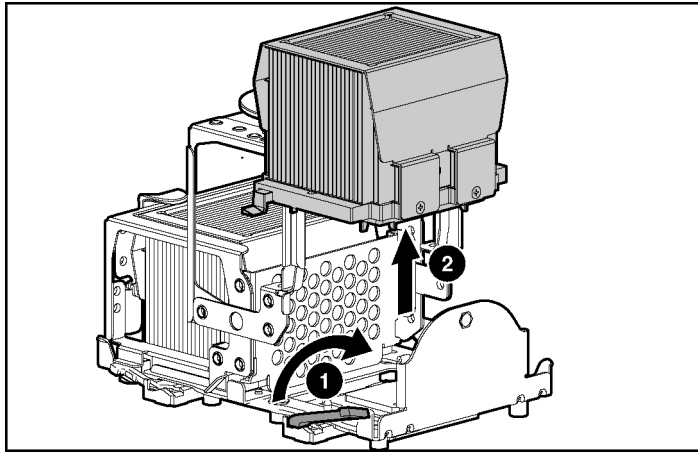


CAUTION: To prevent thermal instability and damage to the server, do not separate the processor from the heatsink. The processor, heatsink, and retaining clip make up a single assembly.



CAUTION: To prevent possible server malfunction and damage to the equipment, do not mix processors of different types.

6. Remove the processor and heatsink assembly.



CAUTION: Failure to completely open the processor locking lever prevents the processor from seating during installation, leading to hardware damage.



CAUTION: When installing a processor, be sure to secure the processor using the processor socket lever before closing the processor retaining bracket. Failure to do so will result in physical damage to the processor and server.



CAUTION: To prevent possible server malfunction and damage to the equipment, do not mix processors of different types.



CAUTION: To prevent possible server malfunction or damage to the equipment, be sure to align the processor pins with the corresponding holes in the socket.

IMPORTANT: If upgrading processor speed, update the system ROM before installing the processor.

IMPORTANT: Processor socket 1 and PPM slot 1 must be populated at all times or the server will not function properly.

IMPORTANT: PPM slots must be populated when processors are installed. If PPM slots are not populated, the server halts during POST or does not boot.

IMPORTANT: If you replace a failed processor or processors, clear the status log in RBSU after powering up the server. For RBSU procedures, refer to the Documentation CD.

To replace the component, reverse the removal procedure.



CAUTION: To prevent possible server malfunction or damage to the equipment, be sure to completely close the processor locking lever.

IMPORTANT: If mixing processor speeds, the server will run at the slowest processor speed.

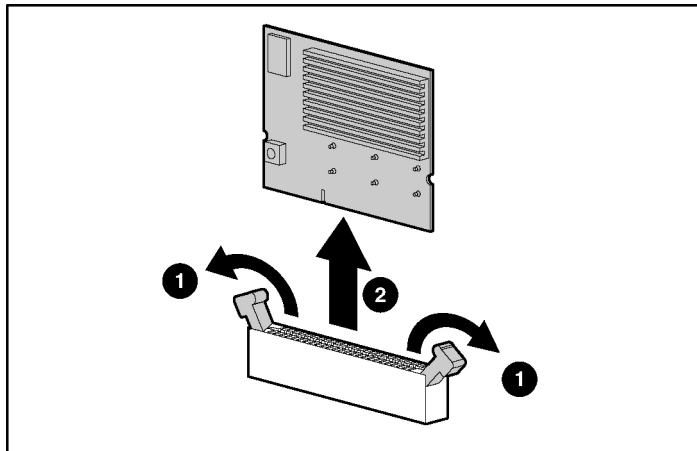
PPM

To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).

NOTE: The appearance of compatible PPMs may vary.

4. Remove the PPM.



IMPORTANT: PPM slots must be populated when processors are installed. If PPM slots are not populated, the server halts during POST or does not boot.

To replace the component, reverse the removal procedure.

Battery

If the server no longer automatically displays the correct date and time, you may need to replace the battery that provides power to the real-time clock.



WARNING: The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose the battery to temperatures higher than 60°C (140°F).
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace only with the spare designated for this product.

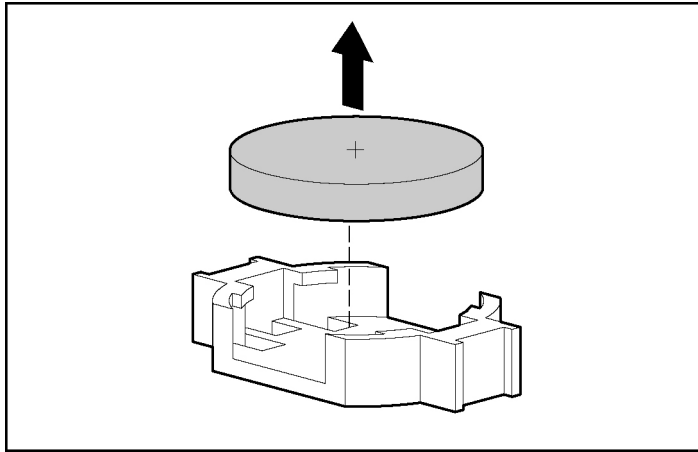
To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).
4. Remove the PCI riser cage ("PCI Riser Cage" on page [33](#)).



CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

5. Remove the battery.



IMPORTANT: Replacing the system board battery resets the system ROM to its default configuration. After replacing the battery, reconfigure the system through RBSU.

To replace the component, reverse the removal procedure.

For more information about battery replacement or proper disposal, contact an authorized reseller or an authorized service provider.

System Board

To remove the component:

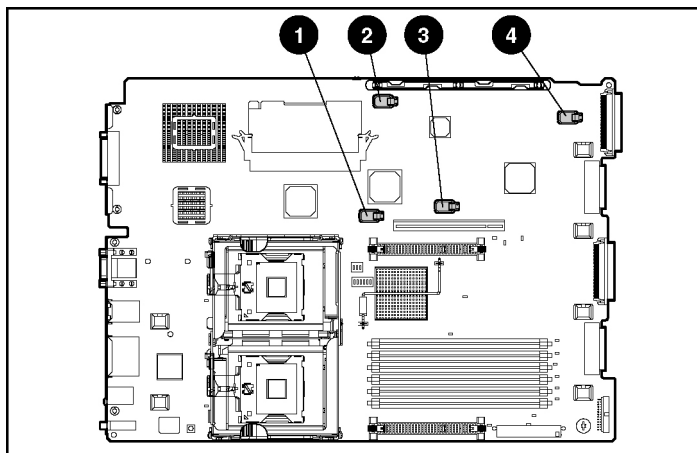
1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).



CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

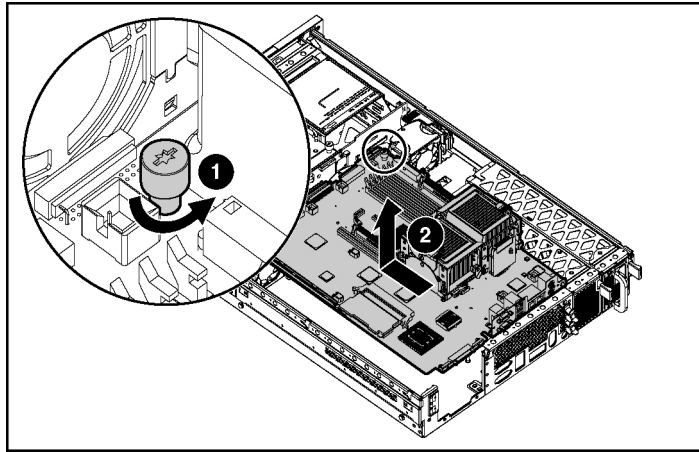
4. Remove the PCI riser cage ("PCI Riser Cage" on page [33](#)).

5. Remove the front fan bracket ("Front Fan Bracket" on page [25](#)).
IMPORTANT: For this procedure, you do not need to remove the hot-plug fans from the front fan bracket. When reinstalling the front fan bracket, press the top of each fan to be sure it seats securely.
6. Remove the hot-plug fans from the rear fan bracket ("Hot-Plug Fan" on page [60](#)).
7. Remove any DDR SDRAM DIMMs ("DIMMs" on page [42](#)).
8. Remove the processors ("Processor" on page [43](#)).
9. Remove the PPMs.
10. Remove the Smart Array 6i cache module ("Smart Array 6i Cache Module" on page [28](#)).
11. Disconnect all cables connected to the system board.
12. Identify the alignment keys and keyhole locations, 1 through 4.



13. Loosen the system board thumbscrew.

14. Remove the system board.



15. Remove the rear fan bracket ("Rear Fan Bracket" on page [26](#)).

IMPORTANT: If replacing the system board or clearing NVRAM, you must re-enter the server serial number through RBSU.

To replace the component, reverse the removal procedure.

Re-Entering the Server Serial Number and Product ID

After you replace the system board, you must re-enter the server serial number and the product ID.

1. During the server startup sequence, press the **F9** key to access RBSU.
2. Select the **System Options** menu.
3. Select **Serial Number**. The following warning is displayed:

WARNING! WARNING! WARNING! The serial number is loaded into the system during the manufacturing process and should NOT be modified. This option should only be used by qualified service personnel. This value should always match the serial number sticker located on the chassis.

4. Press the **Enter** key to clear the warning.
5. Enter the serial number and press the **Enter** key.

6. Select **Product ID**.
7. Enter the product ID and press the **Enter** key.
8. Press the **Esc** key to close the menu.
9. Press the **Esc** key to exit RBSU.
10. Press the **F10** key to confirm exiting RBSU. The server will automatically reboot.

Hot-Plug Procedures

In This Section

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Power Supply Blank	59
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Hot-Plug SCSI Hard Drive

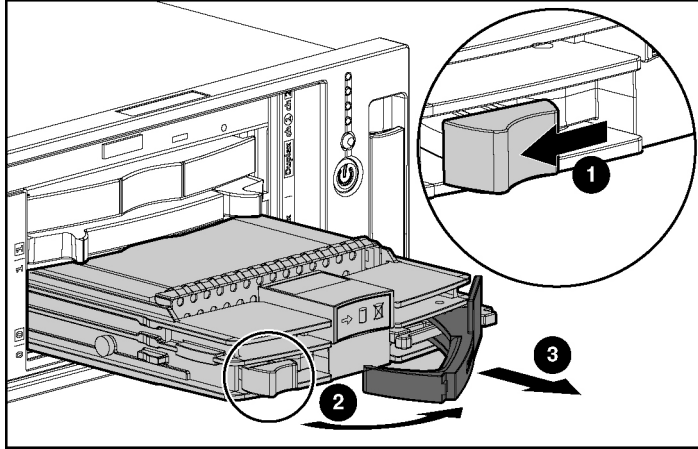
To remove the component:



CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

1. Determine the status of the hard drive from the hot-plug hard drive LEDs ("Hot-Plug SCSI Hard Drive LEDs" on page [104](#)).
2. Back up all server data on the hard drive.

3. Remove the hard drive.



To replace the component, reverse the removal procedure.

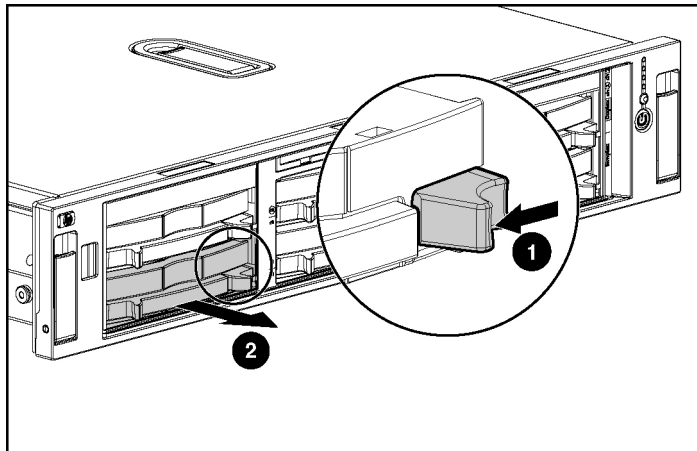
Hard Drive Blank

To remove the component:



CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

NOTE: The server ships standard with five hard drive blanks.



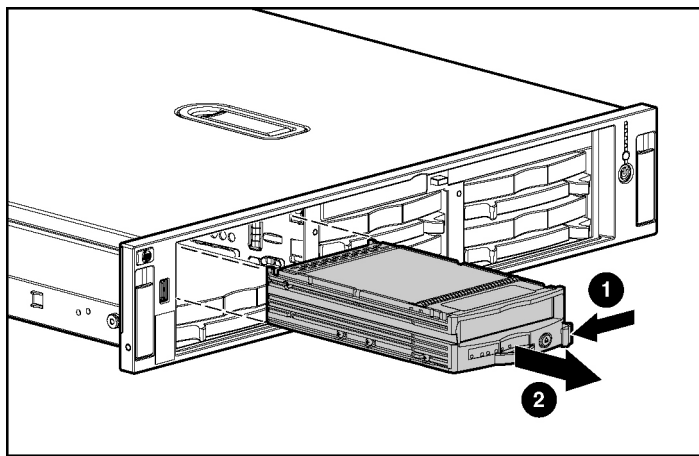
To replace the blank, slide the blank into the bay until it locks into place.

Universal Hot-Plug Tape Drive

To remove the component:



CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.



To replace the component, slide the drive into the bay until it locks into place.

Tape Drive Blank

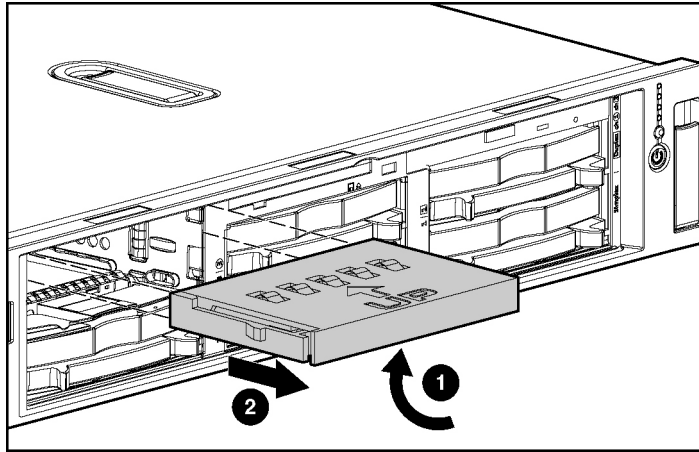
To remove the component:



CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

1. Reach underneath and squeeze the middle of the tape drive blank.

2. Pull the blank out of the bay.



To replace the blank, slide the blank into the bay until it locks into place.

Hot-Plug Power Supply

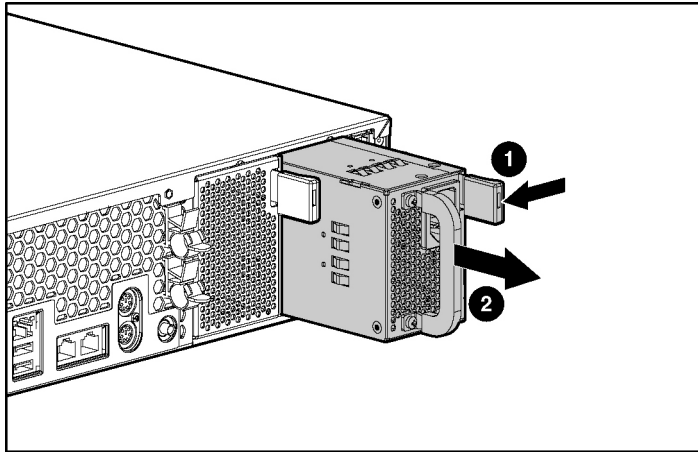
To remove the component:



CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

1. Determine how many hot-plug power supplies are installed:
 - If only one hot-plug power supply is installed, power down and remove the power cord from the server ("Powering Down the Server" on page [17](#)).
 - If more than one hot-plug power supply is installed, continue with the next step.
2. Do one of the following:
 - If the cable management arm is hinged on the left side, proceed by opening the cable management arm (on page [19](#)).

- If the cable management arm is hinged on the right side, proceed by removing the cable management arm (on page [20](#)).
3. Remove the hot-plug power supply.



To replace a hot-plug power supply:

1. Slide the hot-plug power supply into the power supply bay.
2. Connect the power cord to the power supply.
3. Install the cable management arm, if removed.
4. Route the power cord through the cable management arm or power cord anchor.
NOTE: If using the power cord anchor, be sure to leave enough slack in the power cord so that the redundant power supply can be removed without disconnecting the power cord from the primary power supply.
5. Close the cable management arm.
6. Connect the power cord to the power source.
7. Be sure that the power supply LED is green ("Rear Panel LEDs and Buttons" on page [94](#)).
8. Be sure that the front panel external health LED is green ("Front Panel LEDs and Buttons" on page [91](#)).

Power Supply Blank

To remove the component:

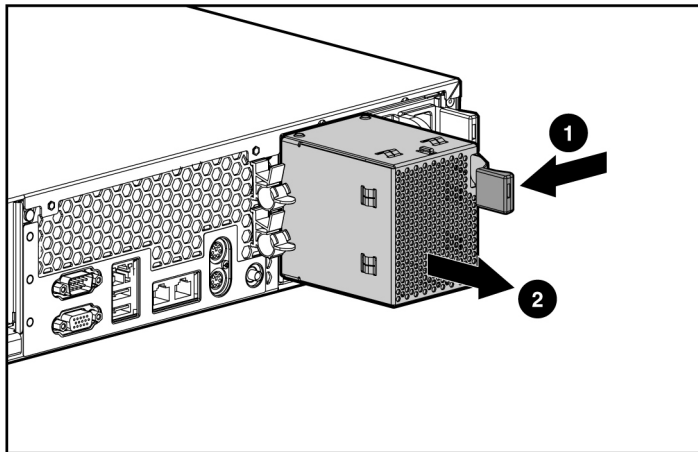


CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

1. Do one of the following:
 - If the cable management arm is hinged on the left side, proceed by opening the cable management arm (on page [19](#)).
 - If the cable management arm is hinged on the right side, proceed by removing the cable management arm (on page [20](#)).
2. Remove the power supply blank.



WARNING: To reduce the risk of personal injury from hot surfaces, allow the power supply or power supply blank to cool before touching it.



Hot-Plug Fan



WARNING: To reduce the risk of electric shock, personal injury, and damage to the equipment:

- Do not attempt to service any parts of the equipment other than those specified in the following procedure. Any other activities may require that you shut down the server and remove the power cord.
- Installation and maintenance of this product must be performed by individuals who are knowledgeable about the procedures, precautions and hazards associated with the product.

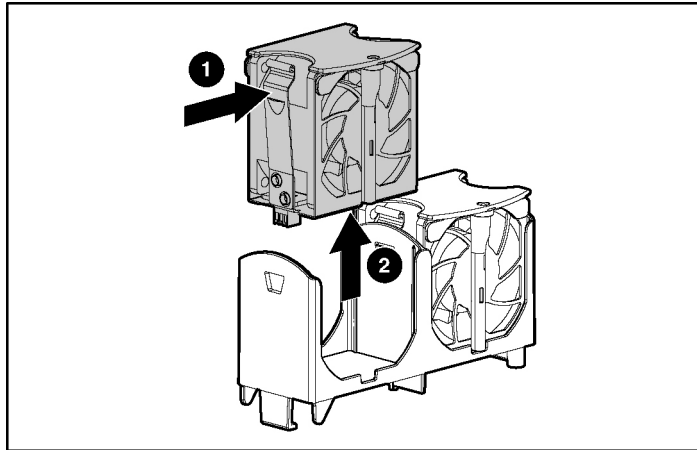
You must observe the following requirements when installing redundant hot-plug fans:

- To ensure optimum cooling, populate the primary fan locations, 2, 4, 5, 6, and 7, before populating the redundant locations ("Identifying Hot-Plug Fans" on page [109](#)).
- If a primary fan fails, replace the non-functioning fan before installing fans in redundant locations ("Identifying Hot-Plug Fans" on page [109](#)).

To remove the component:

1. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
2. Remove the access panel ("Removing the Access Panel" on page [19](#)).
3. If the server is operating with less than seven functional fans, power down the server ("Powering Down the Server" on page [17](#)), then continue with the next step.

4. Remove the non-functioning fan.



CAUTION: Do not operate the server for long periods without the access panel. Operating the server without the access panel results in improper airflow and improper cooling that can lead to thermal damage.

IMPORTANT: For optimum cooling, install fans in all primary fan locations. For more information, refer to the fan locations table ("Identifying Hot-Plug Fans" on page [109](#)).

To replace the component, reverse the removal procedure.

PCI Hot Plug Expansion Board

NOTE: Hot-plug functionality is supported only under Microsoft® Windows® 2000 and Windows® 2003. Hot-plug drivers are not required.

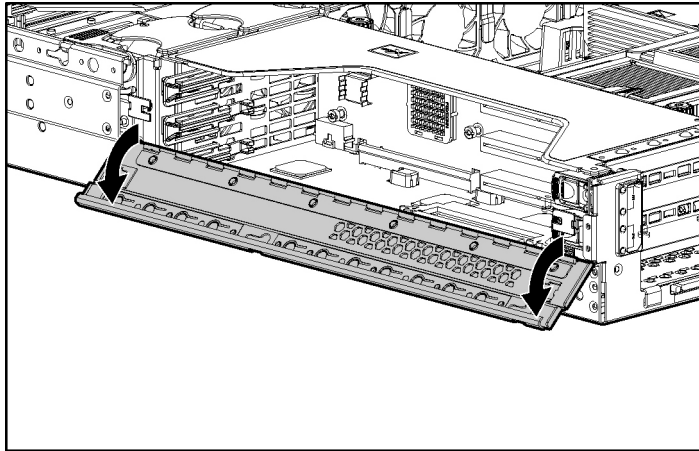
To remove the component:



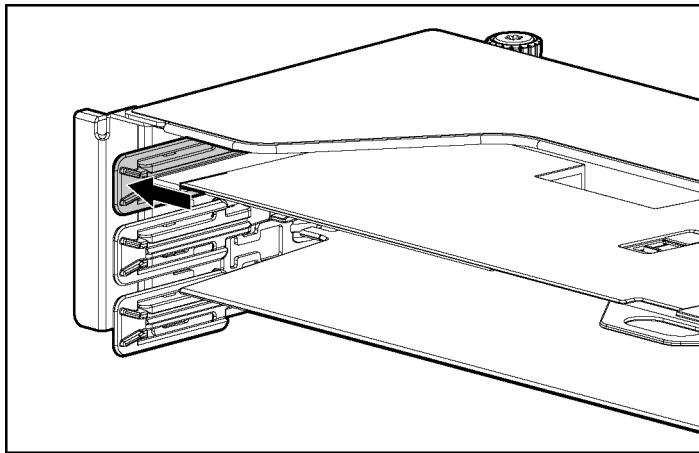
CAUTION: If the operating system installed on the server does not support PCI Hot Plug functionality, power down the server before removing expansion boards.

1. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).

2. Remove the access panel ("Removing the Access Panel" on page [19](#)).
3. Open the PCI riser cage door.



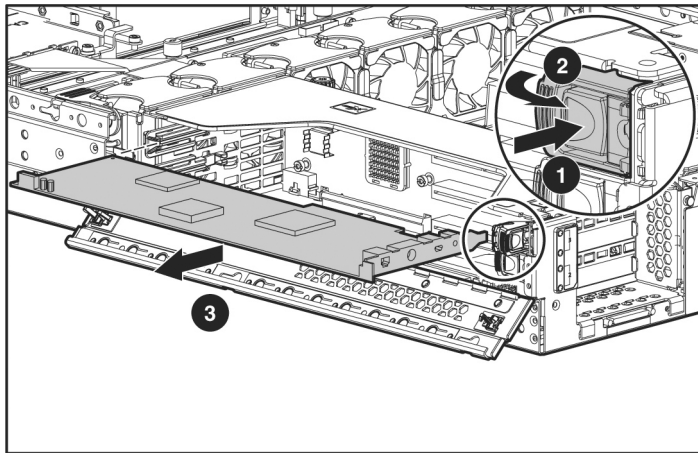
4. Press the PCI Hot Plug button ("Internal PCI Hot Plug LEDs and Button" on page [106](#)) to remove power from the slot. When the green power LED on the slot stops flashing, power has been removed from the slot.
5. Unlock the PCI retaining clip.





CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all PCI slots have either an expansion slot cover or an expansion board installed.

6. Remove the expansion board.



To replace the component, reverse the removal procedure.

PCI Hot Plug Expansion Slot Cover

NOTE: Hot-plug functionality is supported only under Microsoft® Windows® 2000 and Windows® 2003. Hot-plug drivers are not required.

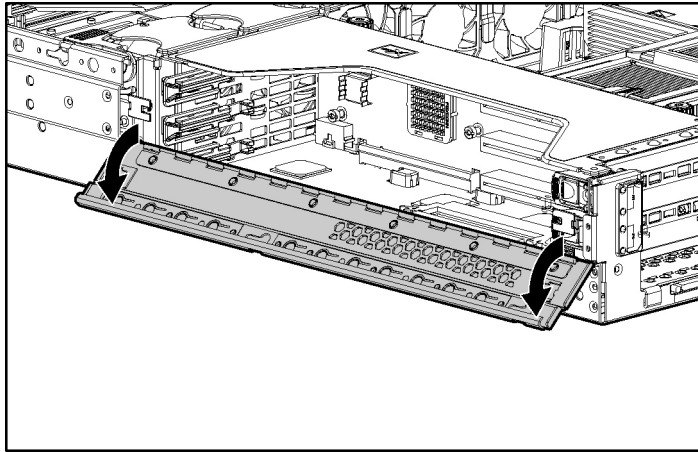
To remove the component:



CAUTION: If the operating system installed on the server does not support PCI Hot Plug functionality, power down the server ("Powering Down the Server" on page [17](#)) before removing expansion boards.

1. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
2. Remove the access panel ("Removing the Access Panel" on page [19](#)).

3. Open the PCI riser cage door.

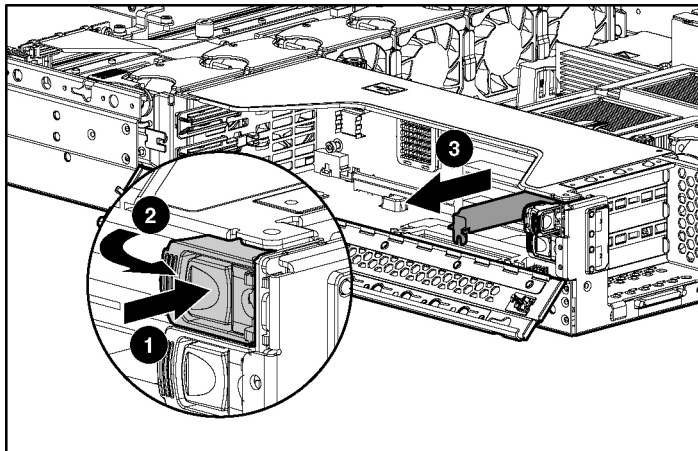


4. Press the PCI Hot Plug button ("Internal PCI Hot Plug LEDs and Button" on page [106](#)) to remove power from the slot. When the green power LED on the slot stops flashing, power has been removed from the slot.



CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all PCI slots have either an expansion slot cover or an expansion board installed.

5. Remove the expansion slot cover.



To replace the component, reverse the removal procedure.

Server Cabling

In This Section

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Cabling

This section provides guidelines that help you make informed decisions about cabling the server and hardware options to optimize performance.

For information on cabling the optional RILOE II board, refer to the *HP Remote Insight Lights-Out Edition II User Guide* on the Documentation CD.

For information on cabling peripheral components, refer to the white paper on high-density deployment in HP or Compaq branded racks on the HP website (<http://www.hp.com>).

Hot-Plug SCSI Hard Drive Cabling

IMPORTANT: If a simplex or duplex cabling configuration is not cabled correctly, the SCSI configuration error LED will illuminate. Refer to "SCSI Backplane LEDs (on page [103](#))" to locate the LED.

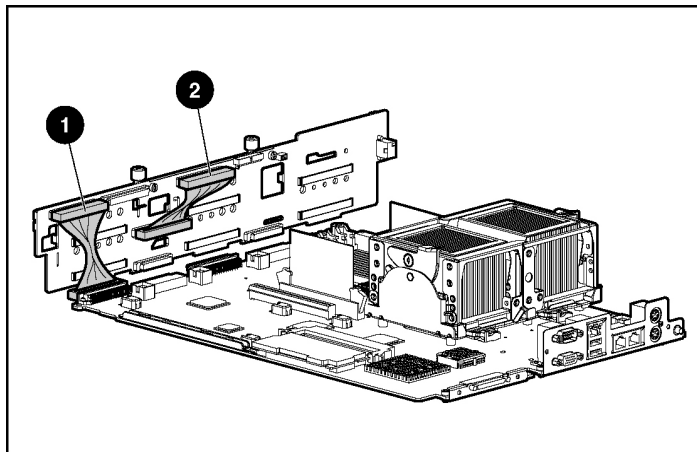
NOTE: The server ships with two identical short SCSI cables. Two optional long SCSI cables may be obtained for PCI Array Controllers. One optional terminator board may be obtained to support duplex SCSI configurations.

The simplex/duplex SCSI backplane supports six cabling configurations, including:

- Embedded simplex
- Embedded duplex
- PCI simplex
- PCI duplex
- Mixed duplex (two configuration options)

Embedded Simplex SCSI Cabling

In the embedded simplex cabling configuration, the embedded Smart Array 6i Controller controls up to six hard drives through one SCSI bus. The server ships standard with this configuration.



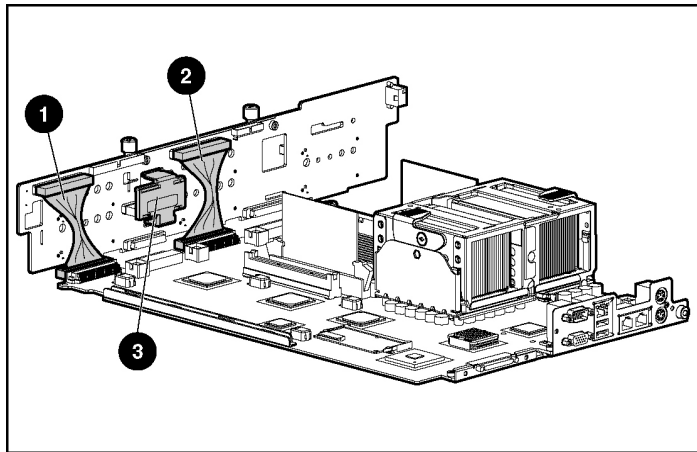
NOTE: The short SCSI cables are identical.

Item	Component description	SCSI IDs managed
1	Short SCSI cable	0, 1, 2, 3, 4, 5
2	Short SCSI cable used to jumper the two SCSI buses together	N/A

Embedded Duplex SCSI Cabling

In the embedded duplex cabling configuration, the embedded Smart Array 6i Controller controls up to six hard drives through two SCSI buses: one bus with up to two drives and the other bus with up to four drives.

NOTE: This specific cabling configuration does not support external VHDCI.



NOTE: Optional SCSI terminator board and optional long SCSI cables are available in the SCSI Configuration Option Kit.

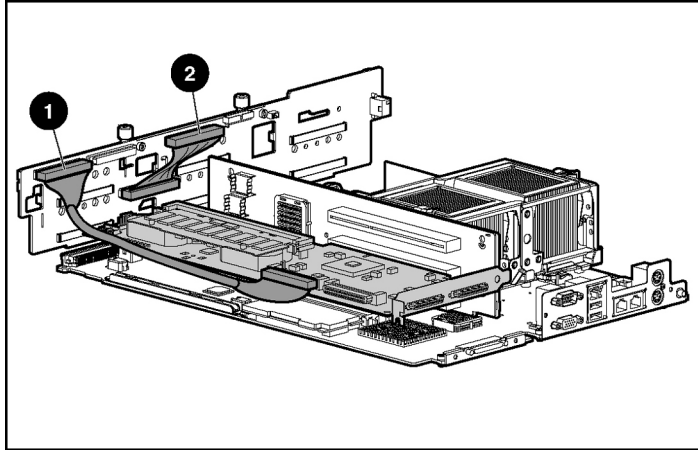
NOTE: The short SCSI cables are identical.

Item	Component description	SCSI IDs managed
1	Short SCSI cable	0, 1
2	Short SCSI cable	2, 3, 4, 5
3	Optional terminator board	N/A

Refer to "Installing the SCSI Terminator Board (on page [73](#))" for SCSI terminator board installation procedures.

PCI Simplex SCSI Cabling

In the PCI simplex cabling configuration, an optional PCI array controller controls up to six hard drives through one SCSI bus.

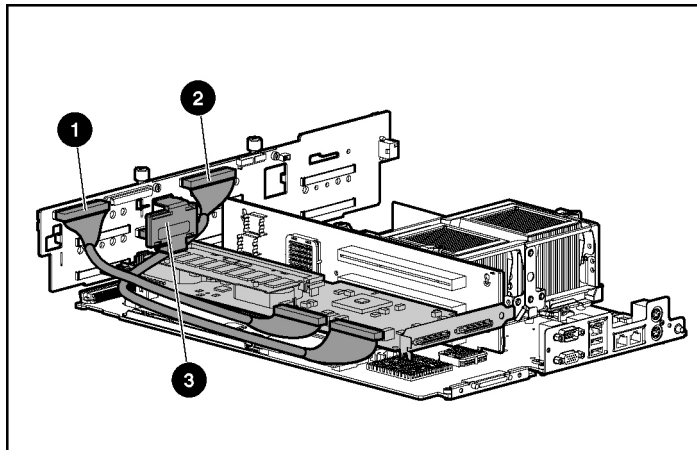


NOTE: Optional SCSI terminator board and optional long SCSI cables are available in the SCSI Configuration Option Kit.

Item	Component description	SCSI IDs managed
1	Optional long SCSI cable	0, 1, 2, 3, 4, 5
2	Short SCSI cable used to jumper the two SCSI buses together	N/A

PCI Duplex SCSI Cabling

In the PCI duplex cabling configuration, an optional PCI array controller controls up to six hard drives through two SCSI buses: one bus with up to two drives and one bus with up to four drives.



NOTE: Optional SCSI terminator board and optional long SCSI cables are available in the SCSI Configuration Option Kit.

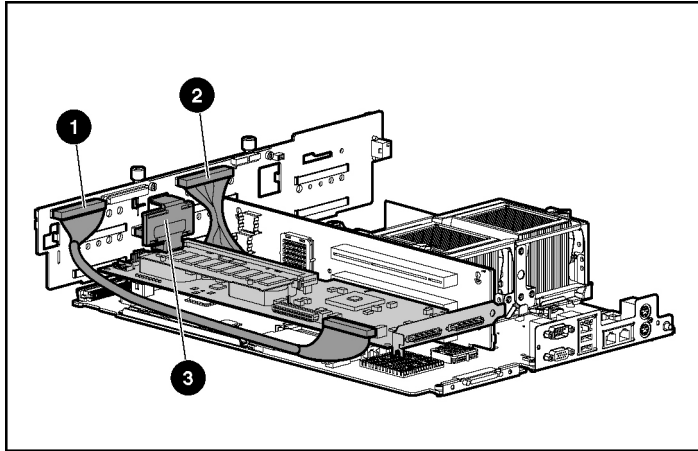
Item	Component description	SCSI IDs managed
1	Optional long SCSI cable	0, 1
2	Optional long SCSI cable	2, 3, 4, 5
3	Optional terminator board	N/A

Refer to "Installing the SCSI Terminator Board (on page [73](#))" for SCSI terminator board installation procedures.

Mixed Duplex SCSI Cabling

In the mixed duplex SCSI cabling configuration, an optional PCI array controller controls up to six hard drives through two SCSI buses: one bus with up to two drives and one bus with up to four drives. Two configuration options are available for mixed duplex SCSI cabling.

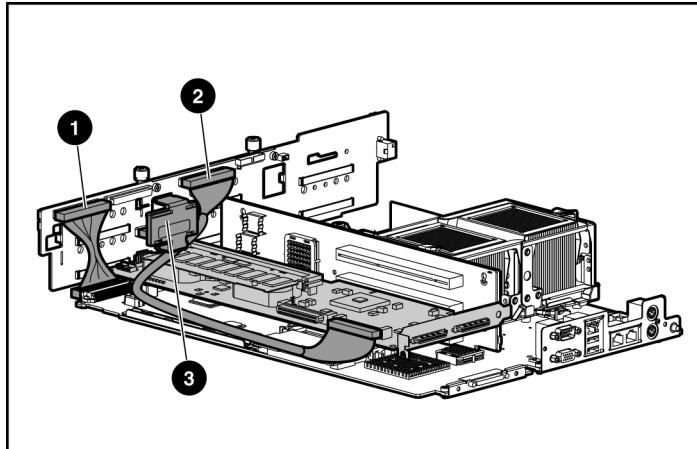
NOTE: This specific cabling configuration does not support external VHDCI.



NOTE: Optional SCSI terminator board and optional long SCSI cables are available in the SCSI Configuration Option Kit.

Item	Component description	SCSI IDs managed
1	Optional long SCSI cable	0, 1
2	Short SCSI cable	2, 3, 4, 5
3	Optional terminator board	N/A

NOTE: This specific cabling configuration supports external VHDCI.



NOTE: Optional SCSI terminator board and optional long SCSI cables are available in the SCSI Configuration Option Kit.

Item	Component description	SCSI IDs managed
1	Short SCSI cable	0, 1
2	Optional long SCSI cable	2, 3, 4, 5
3	Optional terminator board	N/A

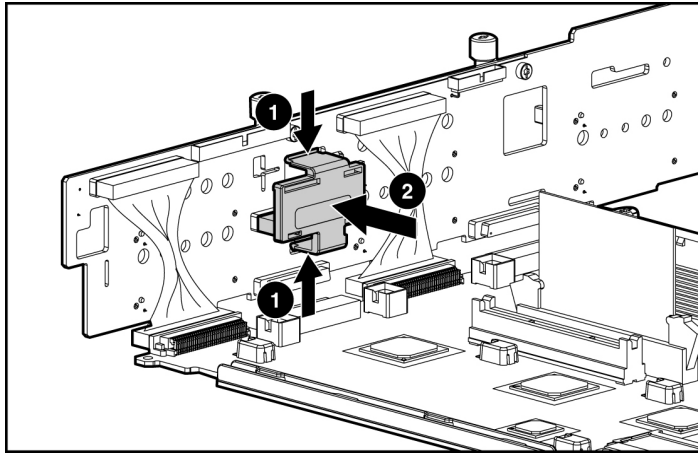
Installing the SCSI Terminator Board

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).
4. Remove the front fan bracket ("Front Fan Bracket" on page [25](#)).

IMPORTANT: For this procedure, you do not need to remove the hot-plug fans from the front fan bracket. When reinstalling the front fan bracket, press the top of each fan to be sure it seats securely.

NOTE: For more information on preparing the server for installation or removal procedures, refer to the Documentation CD.

5. Install the SCSI terminator board.

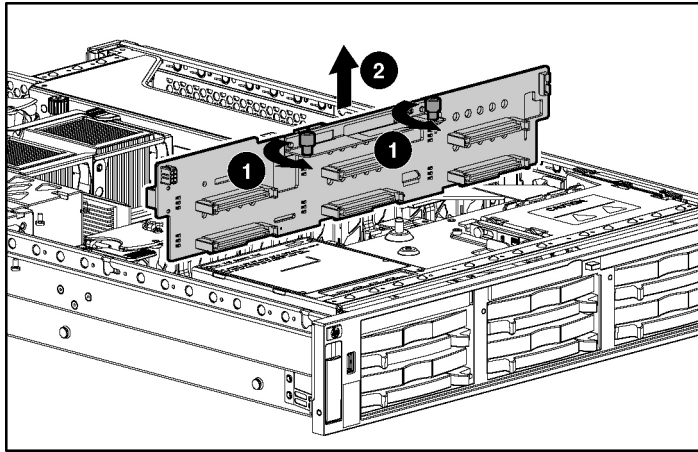


SCSI Backplane

To remove the component:

1. Power down the server ("Powering Down the Server" on page [17](#)).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page [16](#), "Removing the Server from the Rack" on page [18](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).
4. Remove all hot-plug SCSI hard drives ("Hot-Plug SCSI Hard Drive" on page [53](#)).
5. Remove the tape drive, if installed ("Universal Hot-Plug Tape Drive" on page [56](#)).
6. Remove the front fan bracket ("Front Fan Bracket" on page [25](#)).
IMPORTANT: For this procedure, you do not need to remove the hot-plug fans from the front fan bracket. When reinstalling the front fan bracket, press the top of each fan to be sure it seats securely.
7. Remove the SCSI terminator, if installed.
8. Disconnect any cables connected to the SCSI backplane.

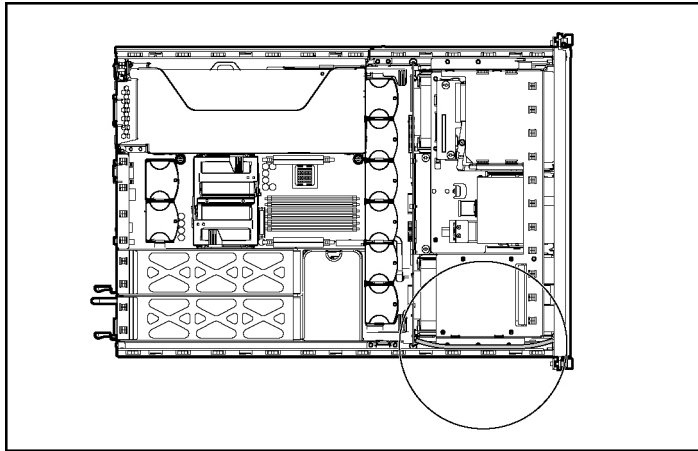
9. Remove the SCSI backplane.



To replace the component, reverse the removal procedure.

USB Cabling

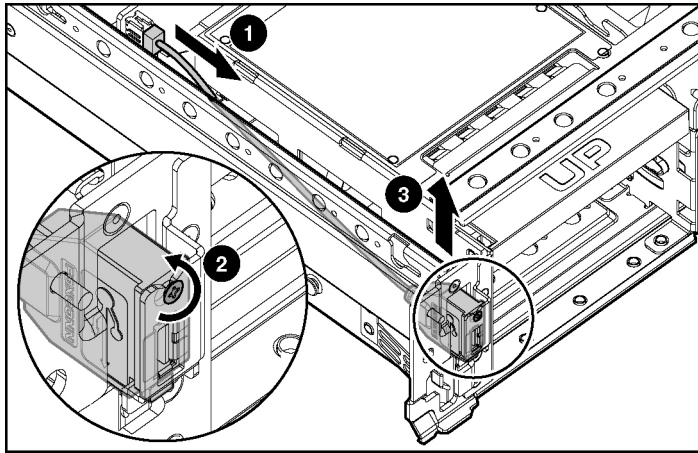
The USB cable connects the front panel USB connector to the SCSI backplane.



To remove the component:

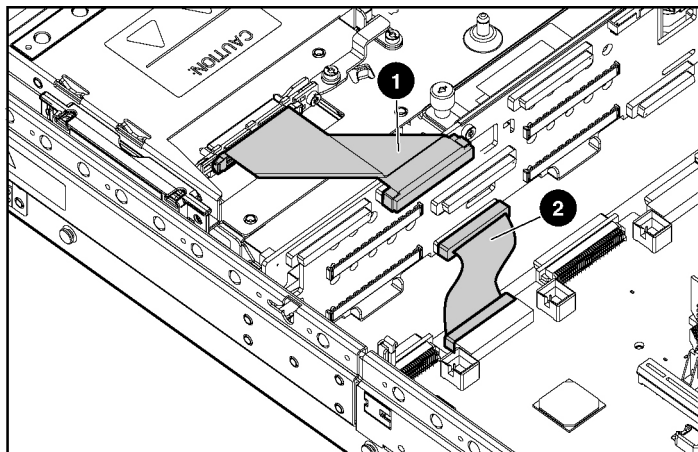
1. Power down the server ("Powering Down the Server" on page [17](#)).

2. Extend the server from the rack, if applicable ("Extending the Server from the Rack" on page [16](#)).
3. Remove the access panel ("Removing the Access Panel" on page [19](#)).
4. Remove the front bezel ("Front Bezel" on page [24](#)).
5. Using a Phillips screwdriver, remove the USB cable.



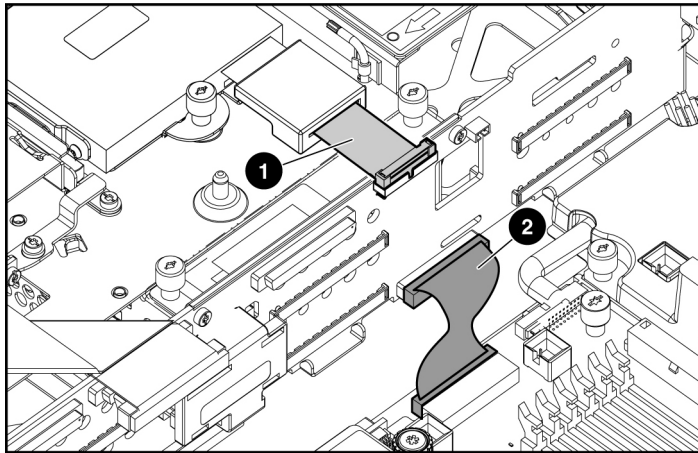
To replace the component, reverse the removal procedure.

DVD/CD-ROM Drive Cabling



Item	Cable Description
1	DVD/CD-ROM drive cable
2	DVD/CD-ROM drive system cable

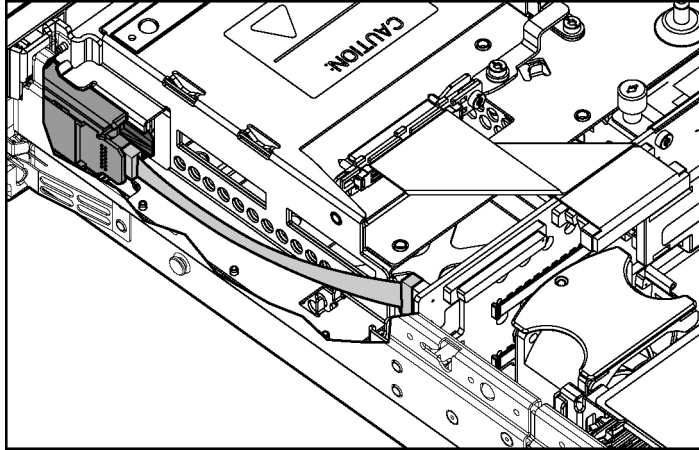
Diskette Drive Cabling



Item	Cable Description
1	Diskette drive cable
2	Diskette drive system cable

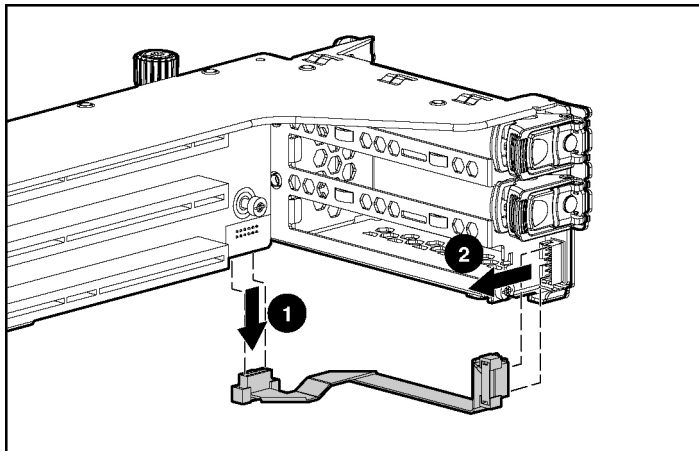
Power Button/LED Cabling

The power button/LED cable connects the power button/LED board to the SCSI backplane.



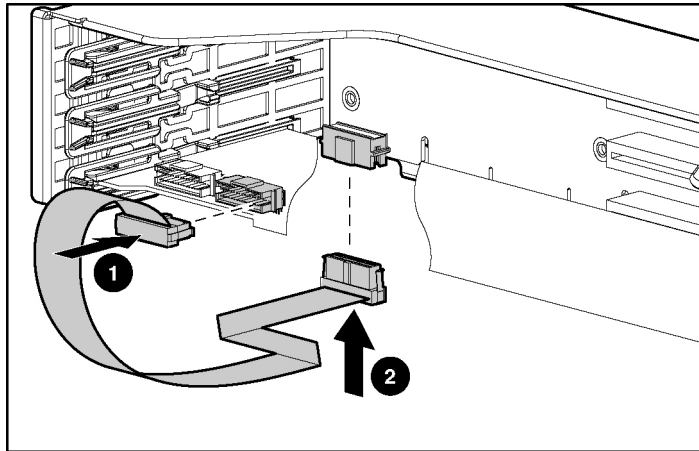
Optional PCI Hot Plug Backplane Cabling

The server contains a PCI Hot Plug backplane that is part of the PCI Hot Plug option and provides hot-plug capability for two expansion slots. A ribbon cable connects the PCI Hot Plug backplane to the riser board.

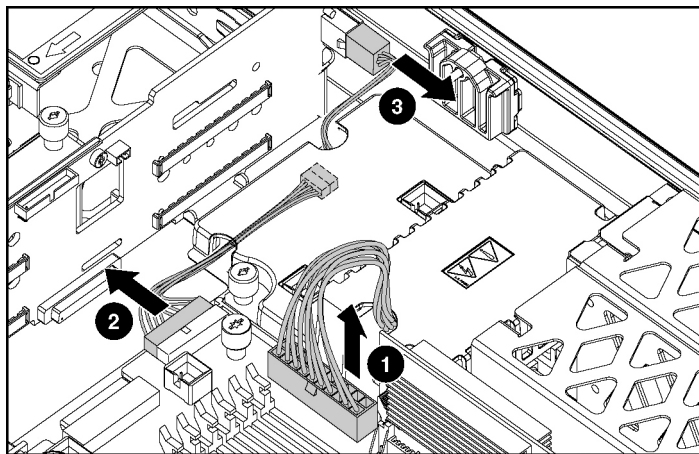


RILOE II Cabling

The 30-pin Remote Insight cable ships with the RILOE II cable kit. For more information, refer to the *Remote Insight Lights-Out Edition II User Guide* on the Documentation CD.

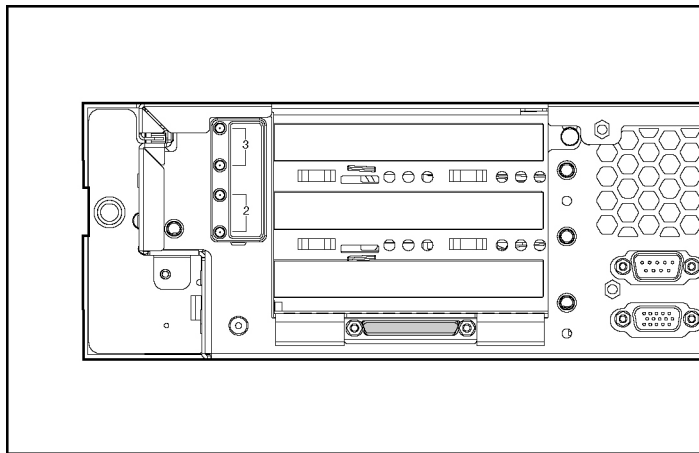


Internal Power Cabling



Item	Description
1	System power cable
2	Power supply signal cable
3	SCSI power cable

External Storage Cabling



The external VHD CI SCSI connector (port 1) can only be used in the following SCSI configurations:

- Embedded simplex
- PCI simplex
- PCI duplex
- Mixed duplex (one of two configuration options)

For more information, refer to "Mixed Duplex SCSI Cabling".

After cabling external storage options, use the following software utilities:

- RBSU, to configure new hardware in the system

For more information, refer to "HP ROM-Based Setup Utility (on page [86](#))" or the *ROM-Based Setup Utility User Guide* on the Documentation CD.

- ORCA, to configure and manage drive arrays

For more information, refer to the *Smart Array 6i Controller User Guide* on the Documentation CD.

For more information on external cabling, refer to the HP website (<http://www.hp.com/products/servers/platforms>).

Diagnostic Tools

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Automatic Server Recovery

ASR is a feature that causes the system to restart when a catastrophic operating system error occurs, such as a blue screen, ABEND, or panic. A system fail-safe timer, the ASR timer, starts when the System Management driver, also known as the Health Driver, is loaded. When the operating system is functioning properly, the system periodically resets the timer. However, when the operating system fails, the timer expires and restarts the server.

ASR increases server availability by restarting the server within a specified time after a system hang or shutdown. At the same time, the HP SIM console notifies you by sending a message to a designated pager number that ASR has restarted the system. You can disable ASR from the HP SIM console or through RBSU.

HP Systems Insight Manager

HP SIM is a web-based application that allows system administrators to accomplish normal administrative tasks from any remote location, using a web browser. HP SIM provides device management capabilities that consolidate and integrate management data from HP and third-party devices.

IMPORTANT: You must install and use HP SIM to benefit from the Pre-Failure Warranty for processors, hard drives, and memory modules.

For additional information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack.

Integrated Management Log

The IML records hundreds of events and stores them in an easy-to-view form. The IML timestamps each event with 1-minute granularity.

You can view recorded events in the IML in several ways, including the following:

- From within HP SIM
- From within Survey Utility
- From within operating system-specific IML viewers
 - For NetWare: IML Viewer
 - For Windows®: IML Viewer
 - For Linux: IML Viewer Application
- From within HP Insight Diagnostics

For more information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack.

Integrated Lights-Out Technology

The iLO subsystem is a standard component of selected ProLiant servers that provides server health and remote server manageability. The iLO subsystem includes an intelligent microprocessor, secure memory, and a dedicated network interface. This design makes iLO independent of the host server and its operating system. The iLO subsystem provides remote access to any authorized network client, sends alerts, and provides other server management functions.

Using iLO, you can:

- Remotely power up, power down, or reboot the host server.
- Send alerts from iLO regardless of the state of the host server.

- Access advanced troubleshooting features through the iLO interface.
- Diagnose iLO using HP SIM through a web browser and SNMP alerting.

For more information about iLO features, refer to the *Integrated Lights-Out User Guide* on the Documentation CD or on the HP website (<http://www.hp.com/servers/lights-out>).

Option ROM Configuration for Arrays

Before installing an operating system, you can use the ORCA utility to create the first logical drive, assign RAID levels, and establish online spare configurations.

The utility provides support for the following functions:

- Configuring one or more logical drives using physical drives on one or more SCSI buses
- Viewing the current logical drive configuration
- Deleting a logical drive configuration

If you do not use the utility, ORCA will default to the standard configuration.

For more information regarding array controller configuration, refer to the controller user guide.

For more information regarding the default configurations that ORCA uses, refer to the *HP ROM-Based Setup Utility User Guide* on the Documentation CD.

HP ProLiant Essentials Rapid Deployment Pack

The RDP software is the preferred method for rapid, high-volume server deployments. The RDP software integrates two powerful products: Altiris Deployment Solution and the HP ProLiant Integration Module.

The intuitive graphical user interface of the Altiris Deployment Solution console provides simplified point-and-click, and drag-and-drop operations that enable you to deploy target servers remotely, perform imaging or scripting functions, and maintain software images.

For more information about the RDP, refer to the HP ProLiant Essentials Rapid Deployment Pack CD or refer to the HP website (<http://www.hp.com/servers/rdp>).

HP ROM-Based Setup Utility

RBSU, an embedded configuration utility, performs a wide range of configuration activities that may include:

- Configuring system devices and installed options
- Displaying system information
- Selecting the operating system
- Selecting the primary boot controller
- Configuring online spare memory

For more information on RBSU, refer to the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (<http://www.hp.com/servers/smartstart>).

SmartStart Software

SmartStart is a collection of software that optimizes single-server setup, providing a simple and consistent way to deploy server configuration. SmartStart has been tested on many ProLiant server products, resulting in proven, reliable configurations.

SmartStart assists the deployment process by performing a wide range of configuration activities, including:

- Configuring hardware using embedded configuration utilities, such as RBSU and ORCA
- Preparing the system for installing "off-the-shelf" versions of leading operating system software
- Installing optimized server drivers, management agents, and utilities automatically with every assisted installation

- Testing server hardware using the Insight Diagnostics Utility ("HP Insight Diagnostics" on page [88](#))
- Installing software drivers directly from the CD. With systems that have internet connection, the SmartStart Autorun Menu provides access to a complete list of ProLiant system software.
- Enabling access to the Array Configuration Utility, Array Diagnostics Utility, and Erase Utility

SmartStart is included in the HP ProLiant Essentials Foundation Pack. For more information about SmartStart software, refer to the HP ProLiant Essentials Foundation Pack or the HP website (<http://www.hp.com/servers/smartstart>).

ROMPaq Utility

Flash ROM enables you to upgrade the firmware (BIOS) with system or option ROMPaq utilities. To upgrade the BIOS, insert a ROMPaq diskette into the diskette drive and boot the system.

The ROMPaq utility checks the system and provides a choice (if more than one exists) of available ROM revisions. This procedure is the same for both system and option ROMPaq utilities.

For more information about the ROMPaq utility, refer to the HP website (<http://www.hp.com/servers/manage>).

System Online ROM Flash Component Utility

The Online ROM Flash Component Utility enables system administrators to efficiently upgrade system or controller ROM images across a wide range of servers and array controllers. This tool has the following features:

- Works offline and online
- Supports Microsoft® Windows NT®, Windows® 2000, Windows® Server 2003, Novell Netware, and Linux operating systems

IMPORTANT: This utility supports operating systems that may not be supported by the server. For operating systems supported by the server, refer to the HP website (<http://www.hp.com/go/supportos>).

- Integrates with other software maintenance, deployment, and operating system tools
- Automatically checks for hardware, firmware, and operating system dependencies, and installs only the correct ROM upgrades required by each target server

To download the tool and for more information, refer to the HP website (<http://h18000.www1.hp.com/support/files/index.html>).

HP Insight Diagnostics

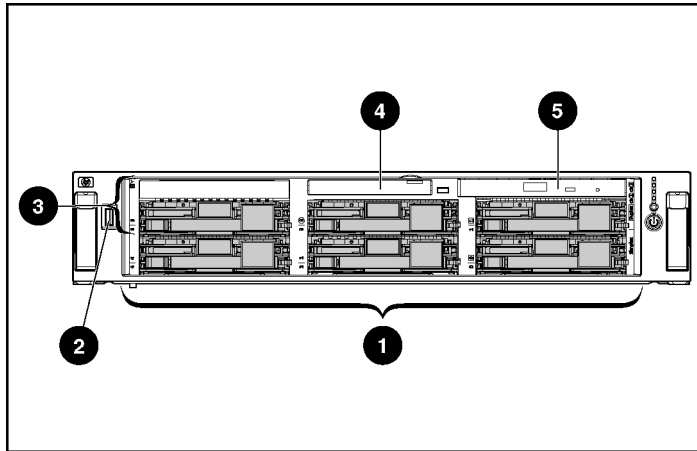
The HP Insight Diagnostics utility displays information about the server hardware and tests the system to be sure it is operating properly. The utility has online help and can be accessed using the SmartStart CD. Online Diagnostics for Microsoft® Windows® is available for download from the HP website (<http://www.hp.com/support>).

Server Component Identification

In This Section

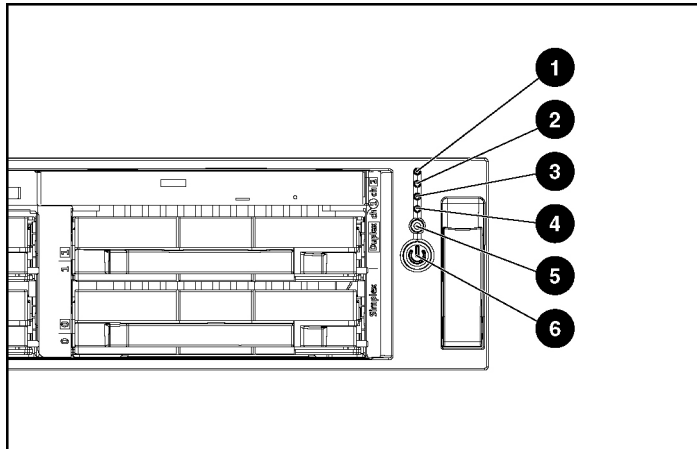
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Front Panel Components



Item	Description
1	Hard drive bays
2	USB port
3	Bay for tape drive or hard drive with tape drive blank
4	Diskette drive bay
5	DVD/CD-ROM drive

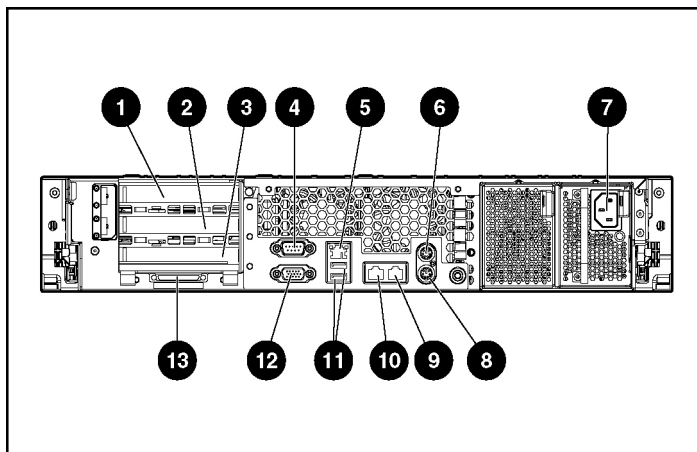
Front Panel LEDs and Buttons



Item	Description	Status
1	Internal health LED	<p>Green = Normal</p> <p>Amber = System degraded. Refer to system board LEDs to identify component in degraded state.</p> <p>Red = System critical. Refer to system board LEDs to identify component in critical state.</p>
2	External health LED (power supply)	<p>Green = Normal</p> <p>Amber = Power redundancy failure</p> <p>Red = Critical power supply failure</p>
3	NIC 1 link/activity LED	<p>Green = Network link</p> <p>Flashing = Network link and activity</p> <p>Off = No link to network. If power is off, view the rear panel RJ-45 LEDs for status.</p>
4	NIC 2 link/activity LED	<p>Green = Network link</p> <p>Flashing = Network link and activity</p> <p>Off = No link to network. If power is off, view the rear panel RJ-45 LEDs for status.</p>

Item	Description	Status
5	UID LED button	Blue = Activated Flashing = System being remotely managed Off = Deactivated
6	Power On/Standby button/system power LED	Green = System on Amber = System shut down, but power still applied Off = Power cord not attached or power supply failure

Rear Panel Components

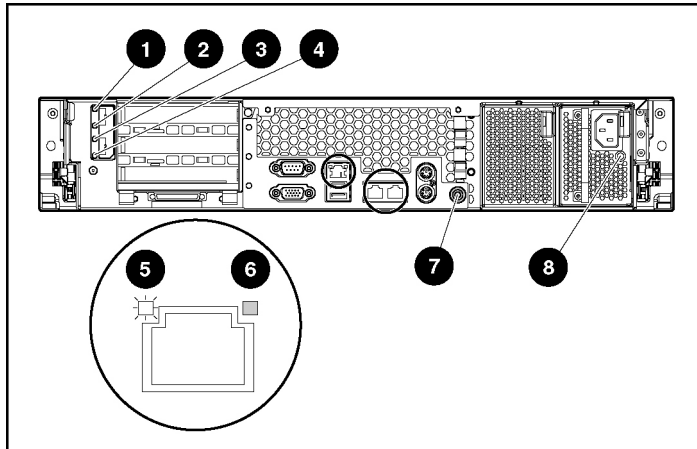


Item	Description	Connector Color
1	<ul style="list-style-type: none"> PCI-X expansion slot 3, 64-bit/100 MHz, Bus B Hot-pluggable PCI-X expansion slot 3, 64-bit/100 MHz, Bus B PCI Express x4 slot 2, Bus B* 	N/A

Item	Description	Connector Color
2	<ul style="list-style-type: none"> • PCI-X expansion slot 2, 64-bit/100 MHz, Bus B • Hot-pluggable PCI-X expansion slot 2, 64-bit/100 MHz, Bus B • PCI Express x4 slot 1, Bus A* 	N/A
3	<ul style="list-style-type: none"> • PCI-X non hot pluggable expansion slot 1, 64-bit/133 MHz, Bus A • Optional PCI-X hot pluggable expansion slot 1, 64-bit/133 MHz, Bus A 	N/A
4	Serial connector	Teal
5	iLO connector	N/A
6	Mouse connector	Green
7	Power cord connector	N/A
8	Keyboard connector	Purple
9	NIC 1 connector	N/A
10	NIC 2 connector	N/A
11	USB connectors	Black
12	Video connector	Blue
13	VHDCI SCSI connector (port 1)	N/A

* x8 PCI Express cards are supported and will run at x4 speeds.

Rear Panel LEDs and Buttons

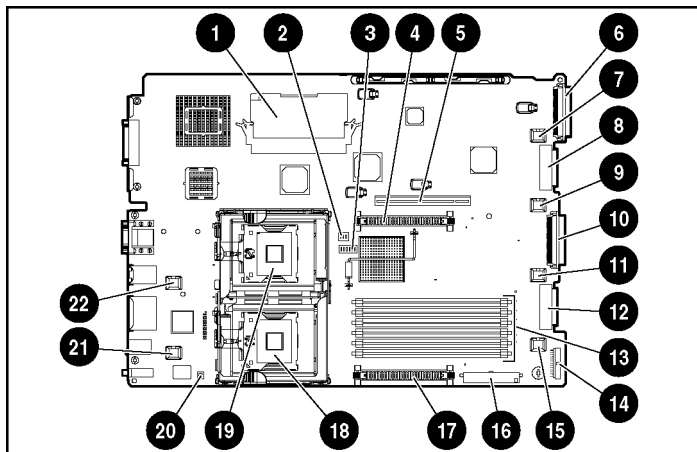


Item	Description	LED Color	Status
1	PCI Hot Plug fault LED (slot 3)*	Amber	On = Expansion board failed Off = Normal
2	PCI Hot Plug power LED (slot 3)*	Green	On = Power is applied to the slot Flashing = Power is cycling Off = Power is not applied to the slot
3	PCI Hot Plug fault LED (slot 2)*	Amber	On = Expansion board failed Off = Normal
4	PCI Hot Plug power LED (slot 2)*	Green	On = Power is applied to the slot Flashing = Power is cycling Off = Power is not applied to the slot
5	RJ-45 activity LED	Green	On or flashing = Network activity Off = No network activity
6	RJ-45 link LED	Green	On = Linked to network Off = Not linked to network

Item	Description	LED Color	Status
7	UID LED button	Blue	On = Activated Flashing = System remotely managed Off = Deactivated
8	Power supply LED	Green	On = Power turned on and power supply functioning properly Off = One or more of the following conditions exists: <ul style="list-style-type: none"> • AC power unavailable • Power supply failed • Power supply in standby mode • Power supply exceeded current limit

* This LED is only available when using the hot-plug expansion cage option.

System Board Components



Item	Description	Item	Description
1	Smart Array 6i Cache Module Option	12	Diskette drive system connector
2	Chassis ID switch	13	DIMM slots (1-6)
3	System maintenance switch	14	Power supply signal connector
4	Processor power module (PPM) slot 2	15	Fan 6 connector
5	PCI riser cage connector	16	System power connector
6	SCSI connector (port 2)	17	PPM slot 1
7	Fan 3 connector	18	Processor socket 1
8	DVD/CD-ROM drive system connector	19	Processor socket 2
9	Fan 4 connector	20	NMI switch
10	SCSI connector (port 1)	21	Fan 2 connector
11	Fan 5 connector	22	Fan 1 connector

System Maintenance Switch

Position	Default	Function
S1	Off	Off = iLO security is enabled. On = iLO security is disabled.
S2	Off	Off = System configuration can be changed. On = System configuration is locked.
S3	Off	Reserved
S4	Off	Off = Booting from diskette is controlled by RBSU. On = Booting from diskette is enabled and RBSU is overridden.

Position	Default	Function
S5	Off	Off = No function On = Clears power-on password and administrator password
S6	Off	Off = No function On = Clear NVRAM.

When the system maintenance switch position 6 is set to the On position, the system is prepared to erase all system configuration settings from both CMOS and NVRAM.



CAUTION: Clearing CMOS and/or NVRAM deletes configuration information. Be sure to properly configure the server or data loss could occur.

NMI Switch

The NMI switch allows administrators to perform a memory dump before performing a hard reset. Crash dump analysis is an essential part of eliminating reliability problems, such as hangs or crashes in operating systems, device drivers, and applications. Many crashes freeze a system, requiring you to do a hard reset. Resetting the system erases any information that would support root cause analysis.

Systems running Microsoft® Windows® operating systems experience a blue screen trap when the operating system crashes. When this happens, Microsoft® recommends that system administrators perform an NMI event by pressing a dump switch. The NMI event enables a hung system to become responsive again.

Chassis ID Switch

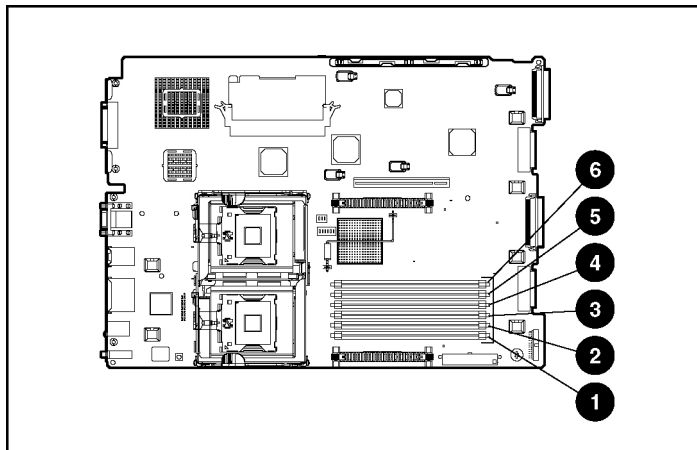
S1 on the Chassis ID ("System Board Components" on page [95](#)) switch determines the chassis ID and functions independently from S2 and S3.

S2 and S3 control the function of the iLO Diagnostic LEDs ("System Board LEDs" on page 99). The on/off combinations of S2 and S3 determine the debug information displayed by the iLO Diagnostic LEDs. Before the server is powered up, the iLO Diagnostic LEDs represent the state of iLO. With the server powered up, the iLO Diagnostic LEDs represent the state of the Chassis ID Switch settings as indicated in the table.

Debug LED Function	S2 Position	S3 Position
Port 85	Off	Off
Port 84	Off	On
iLO	On	Off
Smart Array 6i	On	On

DIMM Slots

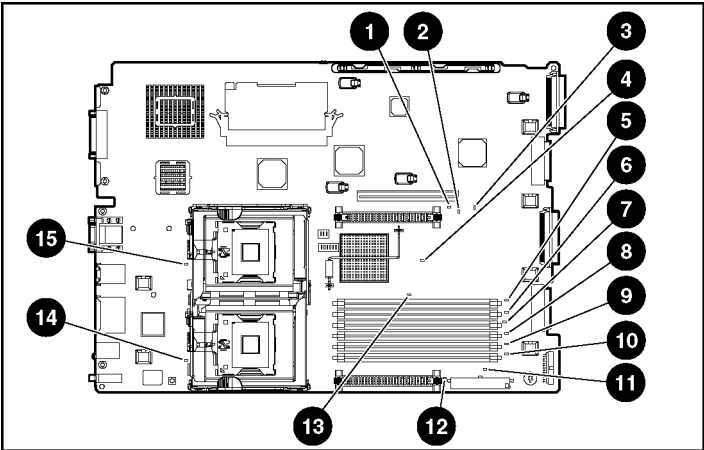
DIMM slots are numbered sequentially (1 through 6) and the paired banks are identified by the letters A, B, and C.



Item	Description
1	DIMM slot 1A
2	DIMM slot 2A

Item	Description
3	DIMM slot 3B
4	DIMM slot 4B
5	DIMM slot 5C
6	DIMM slot 6C

System Board LEDs



Item	LED Description	Status
1	PPM 2 failure	Amber = PPM failed Off = Normal
2	Overtemperature	Amber = Cautionary or critical temperature level detected Off = Temperature OK
3	Riser interlock	Amber = PCI riser cage not seated Off = PCI riser cage is seated
4	Fan failure LED	Off = Fan is not powered Green = Normal Amber = Failure

Item	LED Description	Status
5	DIMM 6C failure	Amber = Memory failed Off = Normal
6	DIMM 5C failure	Amber = Memory failed Off = Normal
7	DIMM 4B failure	Amber = Memory failed Off = Normal
8	DIMM 3B failure	Amber = Memory failed Off = Normal
9	DIMM 2A failure	Amber = Memory failed Off = Normal
10	DIMM 1A failure	Amber = Memory failed Off = Normal
11	Online spare memory	Amber = Failover, online spare memory in use Green = Enabled, but not in use Off = Disabled
12	PPM 1 failure	Amber = PPM failed Off = Normal
13	iLO diagnostic LEDs	Refer to the <i>HP Integrated Lights-Out User Guide</i> on the Documentation CD.
14	Processor 1 failure	Amber = Processor failed Off = Normal
15	Processor 2 failure	Amber = Processor failed Off = Normal

System LEDs and Internal Health LED Combinations

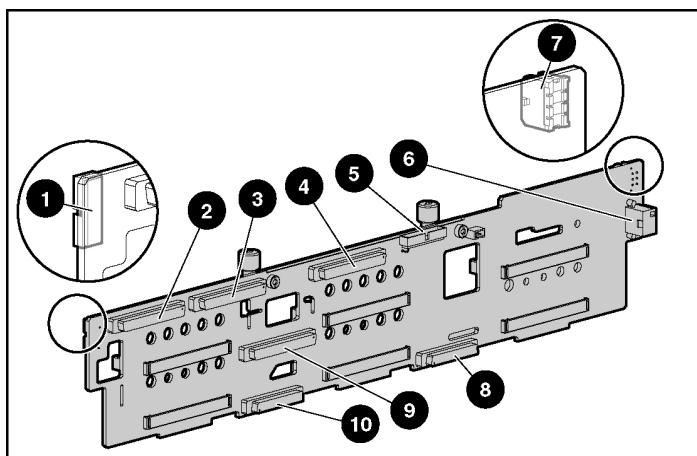
When the internal health LED on the front panel illuminates either amber or red, the server is experiencing a health event. Combinations of illuminated system LEDs and the internal health LED indicate system status.

The front panel health LEDs indicate only the current hardware status. In some situations, HP SIM may report server status differently than the health LEDs because the software tracks more system attributes.

System LED and Color	Internal Health LED Color	Status
Processor failure, socket <i>X</i> (Amber)	Red	One or more of the following conditions may exist: <ul style="list-style-type: none"> Processor in socket <i>X</i> has failed. Processor <i>X</i> is not installed in the socket. Processor <i>X</i> is unsupported. ROM detects a failed processor during POST.
	Amber	Processor in socket <i>X</i> is in a pre-failure condition.
PPM failure, slot <i>X</i> (Amber)	Red	<ul style="list-style-type: none"> PPM in slot <i>X</i> has failed. PPM is not installed in slot <i>X</i>, but the corresponding processor is installed.
DIMM failure, slot <i>X</i> (Amber)	Red	<ul style="list-style-type: none"> DIMM in slot <i>X</i> has failed.
	Amber	<ul style="list-style-type: none"> DIMM in slot <i>X</i> is in a pre-failure condition.
DIMM failure, all slots in one bank (Amber)	Red	No valid or usable memory is installed in the system.
Overtemperature (Amber)	Red	<ul style="list-style-type: none"> The Health Driver has detected a cautionary temperature level. The server has detected a hardware critical temperature level.
Riser interlock (Amber)	Red	PCI riser cage is not seated.
Online spare memory (Amber)	Amber	Bank <i>X</i> failed over to the online spare memory bank.
Power converter module (Amber)	Red	Power converter module has failed.
Fan (Amber)	Amber	Redundant fan has failed.
	Red	The minimum fan requirements are not being met. One or more fans have failed or are missing.

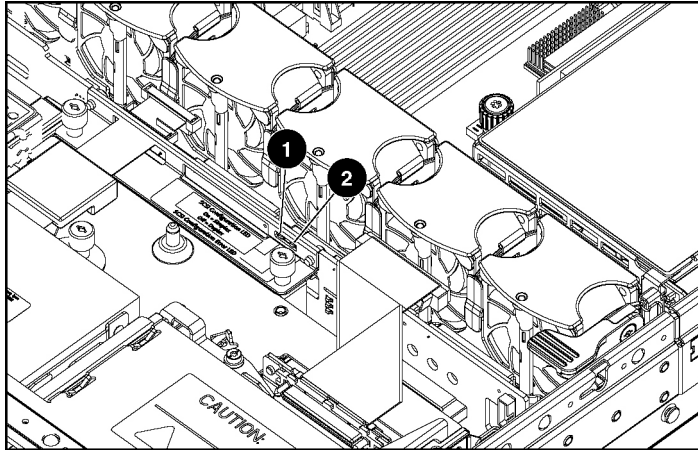
System LED and Color	Internal Health LED Color	Status
SCSI configuration error (Amber)	Red	SCSI cabling or terminator configuration is incorrect for SCSI backplane.

SCSI Backplane Components



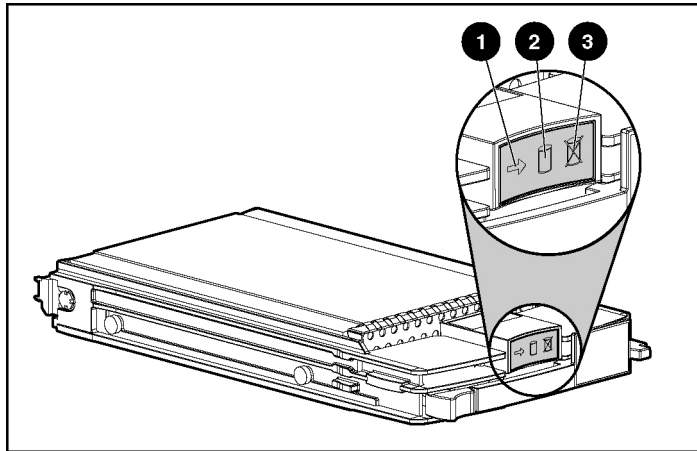
Item	Description
1	Power button/LED system connector
2	SCSI connector (port 2)
3	DVD/CD-ROM drive connector
4	SCSI connector (port 1)
5	Diskette drive connector
6	Power connector
7	USB system connector
8	Diskette drive system connector
9	SCSI connector (used with a jumper cable in simplex mode or terminator board in duplex mode)
10	DVD/CD-ROM drive system connector

SCSI Backplane LEDs



Item	LED Description	Status
1	SCSI configuration	On = Simplex Off = Duplex
2	SCSI configuration error	On = SCSI cabling or terminator configuration is incorrect Off = SCSI cabling or terminator configuration is correct

Hot-Plug SCSI Hard Drive LEDs

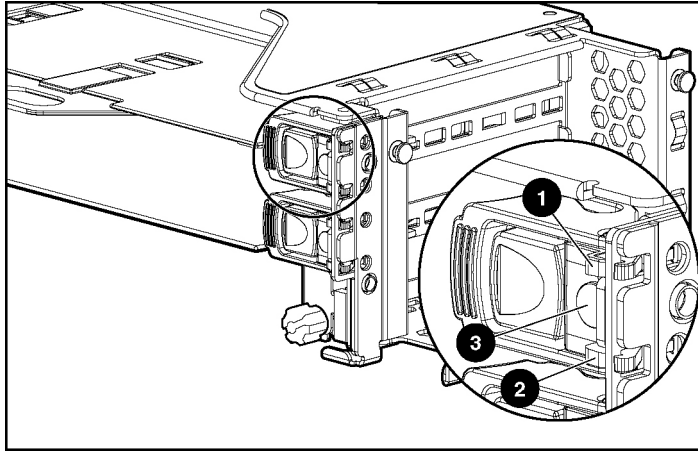


Item	LED Description	Status
1	Activity status	On = Drive activity Flashing = High activity on the drive or drive is being configured as part of an array. Off = No drive activity
2	Online status	On = Drive is part of an array and is currently working. Flashing = Drive is actively online. Off = Drive is offline.
3	Fault status	On = Drive failure Flashing = Fault-process activity Off = No fault-process activity

Hot-Plug SCSI Hard Drive LED Combinations

Activity LED (1)	Online LED (2)	Fault LED (3)	Interpretation
On, off, or flashing	On or off	Flashing	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
On, off, or flashing	On	Off	The drive is online and is configured as part of an array. If the array is configured for fault tolerance and all other drives in the array are online, and a predictive failure alert is received or a drive capacity upgrade is in progress, you may replace the drive online.
On or flashing	Flashing	Off	Do not remove the drive. Removing a drive may terminate the current operation and cause data loss. The drive is rebuilding or undergoing capacity expansion.
On	Off	Off	Do not remove the drive. The drive is being accessed, but (1) it is not configured as part of an array; (2) it is a replacement drive and rebuild has not yet started; or (3) it is spinning up during the POST sequence.
Flashing	Flashing	Flashing	Do not remove the drive. Removing a drive may cause data loss in non-fault-tolerant configurations. Either (1) the drive is part of an array being selected by an array configuration utility; (2) Drive Identification has been selected in HP SIM; or (3) drive firmware is being updated.
Off	Off	On	The drive has failed and has been placed offline. You may replace the drive.
Off	Off	Off	Either (1) the drive is not configured as part of an array; (2) the drive is configured as part of an array, but it is a replacement drive that is not being accessed or being rebuilt yet; or (3) the drive is configured as an online spare. If the drive is connected to an array controller, you may replace the drive online.

Internal PCI Hot Plug LEDs and Button



NOTE: Hot-plug LEDs are available only with the optional hot-plug PCI riser cage.

Item	Description	Status
1	Fault LED (Amber)	On = Expansion board failed. Off = Normal
2	Power LED (Green)	On = Power is applied to the slot. Flashing = Power is cycling. Off = Power is not applied to the slot.
3	PCI Hot Plug button	N/A

PCI Hot Plug LED Status Combinations

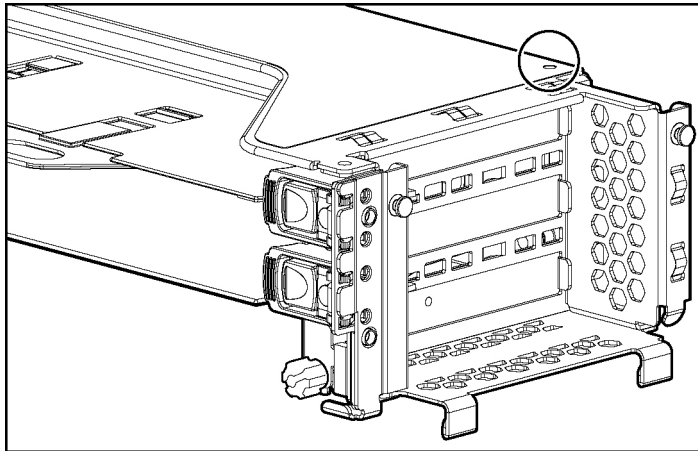
Power LED (Green)	Fault LED (Amber)	OK to open?	Slot Status
On	Off	No	The power to the slot is on and the slot is functioning normally. Do NOT open the slot release lever.

Power LED (Green)	Fault LED (Amber)	OK to open?	Slot Status
On	On	No	The power to the slot is on, but the slot needs attention for a possible problem with the slot, board, or driver. DO NOT open the slot release lever. Examine the logs and HP SIM. If the expansion board is faulty, remove or replace the board.
Flashing	On or off	No	The power to the slot is being turned off or on, which may take several seconds. DO NOT open the slot release lever. To cancel the operation, press the PCI Hot Plug button.
Off	On	Yes	The power to the slot is off, but the slot needs attention for a possible problem with the slot, board, or driver.
Off	Off	Yes	The power to the slot is off.

PCI Riser Cage LED



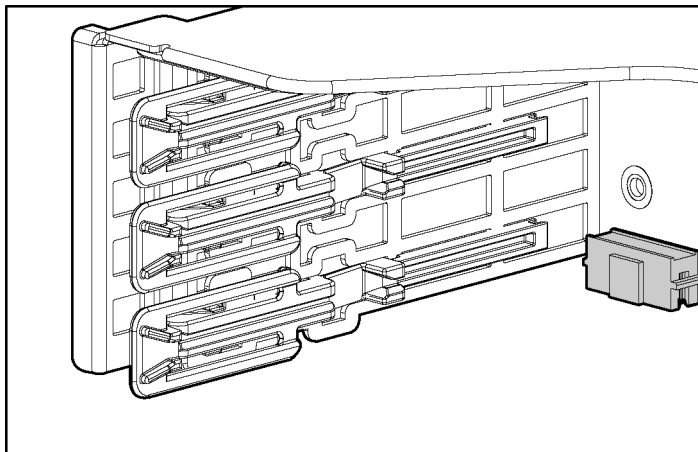
CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.



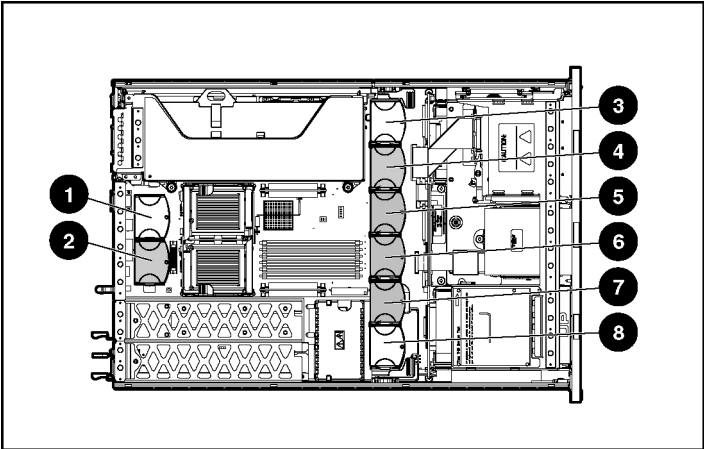
Status
On = AC power connected
Off = AC power disconnected

Remote Management Connector

The 30-pin remote management connector, located on the PCI riser cage, is used to cable the Remote Insight Lights-Out Edition II option. For more information, refer to "RILOE II Cabling" in the user guide or the *Remote Insight Lights-Out Edition II User Guide* on the Documentation CD.

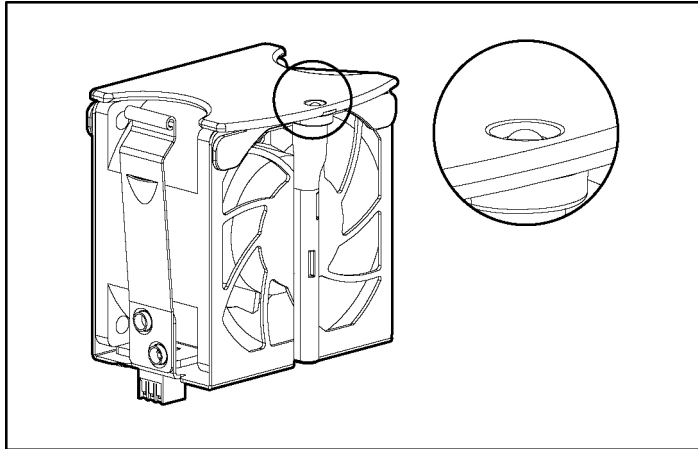


Identifying Hot-Plug Fans



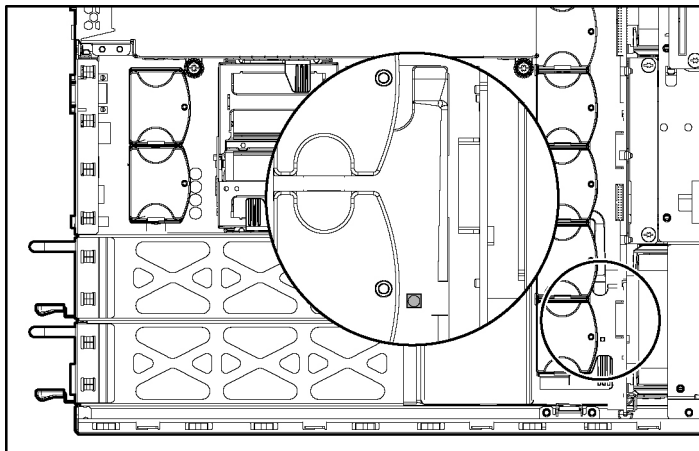
Item	Description	Configuration
1	Fan 1	Redundant
2	Fan 2	Primary
3	Fan 3	Redundant
4	Fan 4	Primary
5	Fan 5	Primary
6	Fan 6	Primary
7	Fan 7	Primary
8	Fan 8	Redundant

Hot-Plug Fan LED



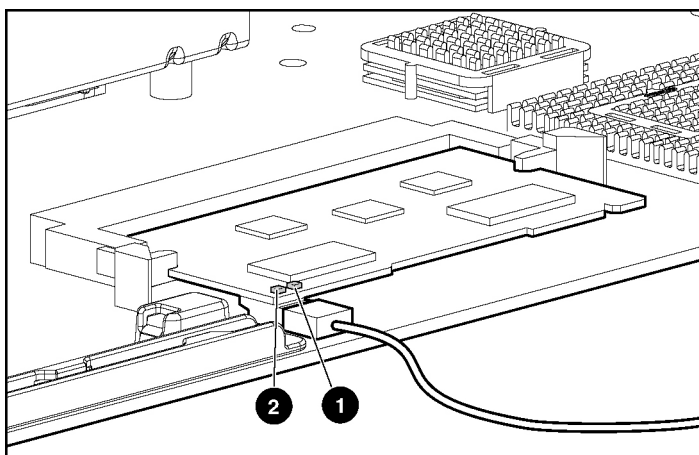
Status
Green = Operating normally
Amber = Failed
Off = No power

Power Converter Module LED



Status
Amber = Failed
Off = Operating normally

Battery-Backed Write Cache LEDs



Item	LED Color
1	Amber
2	Green

For LED status information, refer to "Battery-Backed Write Cache LED Statuses (on page [112](#))."

Battery-Backed Write Cache LED Statuses

Server Status	LED Status	Battery Module Status
Server is on and has normal run time	Green = On	Fast charging
	Green = Flashing	The microcontroller is waiting for communication from the host controller.
	Green = Off	The battery is fully charged.
	Amber = On	A short exists in the connection of one or more of the three button cells within the battery module.
	Amber = Flashing	An open exists in the circuit between the positive and negative terminals of the battery module.
	Amber = Off	Normal
Server is off and is in data retention mode	Amber = Flashing every 15 seconds	User data held in the write cache is being backed up.

Specifications

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Server Specifications

Dimensions	
Height	8.59 cm (3.38 in)
Depth	66.07 cm (26.01 in)
Width	44.54 cm (17.54 in)
Weight (maximum)	27.22 kg (60 lb)
Weight (no drives installed)	20.41 kg (47.18 lb)
Input requirements	
Rated input voltage	100 to 132 VAC, 200 to 240 VAC
Rated input frequency	50 Hz to 60 Hz
Rated input current	7.5 A (100 VAC), 3.8 A (200 VAC)
Rated input power	735 W
BTUs per hour	2508
Power supply output	
Rated steady-state power	575 W
Maximum peak power	575 W

Environmental Specifications

Temperature range*	
Operating	10°C to 35°C (50°F to 95°F)
Shipping	-30°C to 50°C (-22°F to 122°F)
Storage	-40°C to 70°C (-40°F to 158°F)
Maximum wet bulb temperature	28°C (82.4°F)
Relative humidity (noncondensing)**	
Operating	10% to 90%
Non-operating	5% to 95%

* All temperature ratings shown are for sea level. An altitude derating of 1°C per 300 m (1.8°F per 1,000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed.

** Storage maximum humidity of 95% is based on a maximum temperature of 45°C (113°F). Altitude maximum for storage corresponds to a pressure minimum of 70 KPa.

Hot-Plug Power Supply Calculations

For hot-plug power supply specifications and calculators to determine electrical and heat loading for the server, refer to the HP Enterprise Configurator website (<http://h30099.www3.hp.com/configurator/>).

DDR2 SDRAM DIMM Specifications



CAUTION: Be sure to install DIMMs in the proper configuration. Refer to the Documentation CD.

Item	Description
Size	512 MB, 1 GB, 2 GB
Width	72 bits

Item	Description
Upgrade requirement *	Any combination of like-paired DDR2 DIMMs that provide a minimum of 512 MB

*Use only 512-MB, 1-GB, or 2-GB, 72-bit wide, 1.8-V, PC2-3200 Registered ECC DDR2. Use HP DDR2 only.

1.44-MB Diskette Drive Specifications

Item	Description
Dimensions	
Height	12.7 mm (0.5 in)
Width	96 mm (3.8 in)
Depth	130 mm (5.1 in)
LEDs (front panel)	Green = On
Read/write capacity per diskette	
High density	1.44 MB
Low density	720 KB
Drives supported	1
Drive height	One-third height
Drive rotation	300 rpm
Transfer rate	
High	500 Kb/s
Low	250 Kb/s
Bytes/sector	512
Sectors per track (high/low)	18/9
Tracks per side (high/low)	80/80
Access times	
Track-to-track (high/low)	3 ms/6 ms
Average (high/low)	169 ms/94 ms

Item	Description
Setting time	15 ms
Latency average	100 ms
Cylinders (high/low)	80/80
Read/write heads	2

CD-ROM Drive Specifications

Item	Description
Applicable disk	CD-ROM (modes 1 and 2); mixed mode (audio and data combined); CD-DA; Photo CD (single/multiple-session), CD-XA ready; CDi ready
Capacity	550 MB (mode 1, 12 cm)
	640 MB (mode 2, 12 cm)
Block size	2368, 2352 bytes (mode 0)
	2352, 2340, 2336, 2048 bytes (mode 1)
	2352, 2340, 2336, 2048 bytes (mode 2)
Dimensions	
Height	12.7 mm (0.50 in)
Depth	132.08 mm (5.20 in)
Width	132.08 mm (5.20 in)
Weight	0.34 kg (0.75 lb)
Data transfer rate	
Sustained	150 KB/s (sustained 1X), 1500/3600 KB/s (10X to 24X)
Burst	16.6 MB/s
Access times (typical)	
Full stroke	300 ms
Random	140 ms
Diameter	12 cm, 8 cm (4.70 in, 3.15 in)
Thickness	1.2 mm (0.05 in)

Item	Description
Track pitch	1.6 μm (6.3×10^{-7} in)
Cache/buffer	128 KB
Startup time	< 10 s
Stop time	< 5 s (single); < 30 s (multisession)
Laser parameters	
Type	Semiconductor laser GaAs
Wave length	700 \pm 25 nm
Divergence angle	53.5° \pm 1.5°
Output power	0.14 mW
Operating conditions	
Temperature	5°C to 45°C (41°F to 118°F)
Humidity	5% to 90%

Ultra320 SCSI Hard Drive Specifications

Item	36.4-GB Ultra320 SCSI Drive	72.8-GB Ultra320 SCSI Drive	72.8-GB Ultra320 SCSI Drive	146.8-GB Ultra320 SCSI Drive
Capacity	36,419.6 MB	72,837.2 MB	72,837.2 MB	146,815.74 MB
Height	1.0 in (One-third height)	1.0 in (One-third height)	1.0 in (One-third height)	One-third, 1.0 in
Width	4.0 in	4.0 in	4.0 in	4.0 in
Interface	Ultra320 SCSI	Ultra320 SCSI	Ultra320 SCSI	Ultra320SCSI
Transfer rate	320 MB/sec	320 MB/sec	320 MB/sec	320 MB/sec
Rotational speed	15,000 rpm	10,000 rpm	15,000 rpm	10,000 rpm
Bytes per sector	512	512	512	512
Logical blocks	71,132,000	142,264,000	142,264,000	286,749,488

Item	36.4-GB Ultra320 SCSI Drive	72.8-GB Ultra320 SCSI Drive	72.8-GB Ultra320 SCSI Drive	146.8-GB Ultra320 SCSI Drive
Operating temperature	10°C to 35°C (50°F to 95°F)	10°C to 35°C (50°F to 95°F)	10°C to 35°C (50°F to 95°F)	10°C to 35°C (50°F to 95°F)

Acronyms and Abbreviations

ABEND

abnormal end

ASR

Automatic Server Recovery

BBWC

battery-backed write cache

BIOS

Basic Input/Output System

DDR

double data rate

DIMM

dual inline memory module

IDE

integrated device electronics

iLO

Integrated Lights-Out

IML

Integrated Management Log

LED

light-emitting diode

NMI

non-maskable interrupt

NVRAM

non-volatile memory

ORCA

Option ROM Configuration for Arrays

PCI

peripheral component interface

PCI Express

peripheral component interconnect express

PCI-X

peripheral component interconnect extended

POST

Power-On Self-Test

PPM

Processor Power Module

RBSU

ROM-Based Setup Utility

RDP

Remote Desktop Protocol

RILOE II

Remote Insight Lights-Out Edition II

SCSI

small computer system interface

SDRAM

synchronous dynamic RAM

SNMP

Simple Network Management Protocol

UID

unit identification

USB

universal serial bus

VHDCI

very high density cable interconnect

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